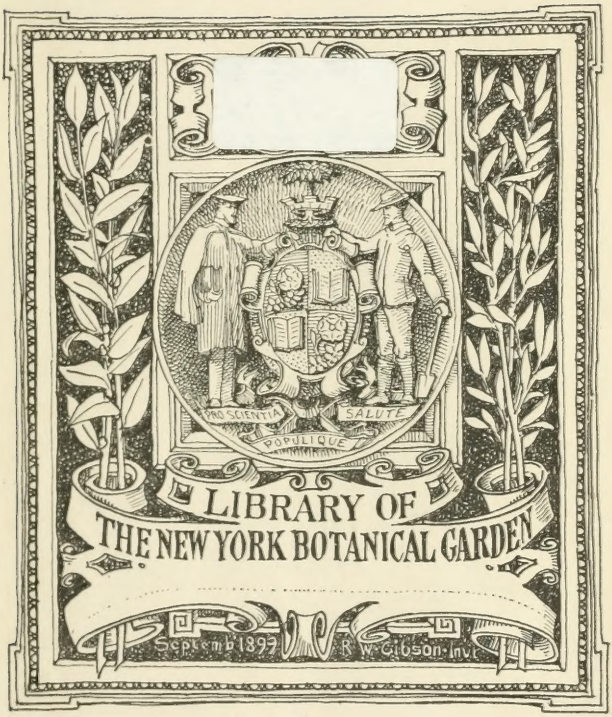
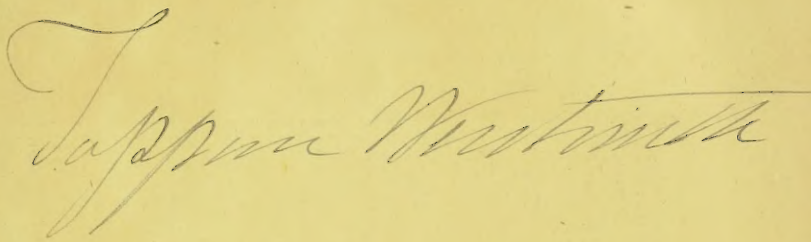
SHOUT
SHARE
IT


PRO SCIENTIA
SALUTE
POPULIQUE
LIBRARY OF
THE NEW YORK BOTANICAL GARDEN
September 1899
R. W. Gibson. Invt.



1. Spikelet, Magnified.
2. Flower.

FOWL MEADOW. See p. 52.

3. Germ

FOURTH ANNUAL REPORT

OF THE

SECRETARY

OF THE

Massachusetts Board of Agriculture,

TOGETHER WITH

THE REPORTS OF COMMITTEES

APPOINTED TO VISIT THE COUNTY SOCIETIES,

LIBRARY
NEW YORK
BOTANICAL
GARDEN

WITH AN APPENDIX,

CONTAINING AN ABSTRACT OF THE

FINANCES OF THE COUNTY SOCIETIES.

1856

BOSTON:
WILLIAM WHITE, PRINTER TO THE STATE.
1857.

N 7766
V. 4
1856

BOARD OF AGRICULTURE,

1857.

EX OFFICIIS.

His Excellency HENRY J. GARDNER.
His Honor HENRY W. BENCHLEY.
FRANCIS DeWITT, *Secretary of State.*

APPOINTED BY THE GOVERNOR AND COUNCIL.

MARSHALL P. WILDER, *of Dorchester.*
JAMES S. GRENNELL, *of Greenfield.*
EPHRAIM W. BULL, *of Concord.*

CHOSEN BY THE SOCIETIES.

Massachusetts, ...	ROBERT C. WINTHROP, *of Boston.*
Essex, ...	MOSES NEWELL, *of West Newbury.*
Middlesex, ...	SAMUEL CHANDLER, *of Lexington.*
Middlesex, South, ...	WILLIAM G. LEWIS, *of Framingham.*
Middlesex, North, ...	JOHN C. BARTLETT, *of Chelmsford.*
Worcester, ...	JOHN BROOKS, *of Princeton.*
Worcester, West, ...	JOSIAH WHITE, *of Petersham.*
Worcester, North, . . .	JABEZ FISHER, *of Fitchburg.*
Worcester, South, ...	OLIVER C. FELTON, *of Brookfield.*
Hampshire, Franklin and Hampden, ...	GEORGE W. HUBBARD, *of Hatfield.*
Hampshire, ...	LUKE SWEETSER, *of Amherst.*
Hampden, ...	FRANCIS BREWER, *of Springfield.*
Hampden, East, ...	
Franklin, ...	THOMAS J. FIELD, *of Northfield.*
Berkshire, ...	JUSTUS TOWER, *of Lanesborough.*
Housatonic, ...	SAMUEL H. BUSHNELL, *of Sheffield.*
Norfolk, ...	BENJAMIN V. FRENCH, *of Braintree.*
Bristol, ...	NATHAN DURFEE, *of Fall River.*
Plymouth, ...	CHARLES G. DAVIS, *of Plymouth.*
Barnstable, ...	GEORGE MARSTON, *of Barnstable.*
Nantucket, ...	EDWARD W. GARDNER, *of Nantucket.*

CHARLES L. FLINT, *Secretary.*

FOURTH ANNUAL REPORT

OF THE

SECRETARY

OF THE

BOARD OF AGRICULTURE.

To the Senate and House of Representatives of the Commonwealth of Massachusetts:—

The various duties of the Board of Agriculture have been attended to with unremitting diligence during the past year. Since the preparation of the Annual Abstract was intrusted to the Board, the call for it among the farmers of the State has been multiplied many fold, till the usual edition has been found too small to supply half the demand. The returns of the county societies have been systematized,—a work of no small extent and importance,—thousands of packages of valuable seeds have been distributed, and many hundred volumes of agricultural documents of other States placed within the reach of our people, by means of exchanges. Much labor has also been devoted to the formation of an Agricultural Museum, to be connected with the office of the Board, where it will be of easy access to the members of the legislature and to the people. In addition to the specimens of minerals and soils collected during the course of the agricultural geological survey of the State some years since,—which now number about three thousand, and many of which have been analyzed, a few of the most valuable of which have been lost,—I have myself obtained

many other valuable specimens of different kinds for the collection from various sources, while individuals are ready to contribute extensively to its enlargement as soon as a proper room is in readiness to receive their contributions.

When the plans for the recent enlargement of the State House were adopted, a room was designed, and has since, by an act of the legislature, been appropriated, for the purpose of receiving the cabinet. But as no provision has been made by the Commonwealth for furnishing this room with the necessary conveniences, it has been impossible for the Board to carry out their original design in regard to it.

Of the great value of such a collection, as representing the progress and the present condition of the agriculture of the State, I need hardly speak. The mere collection of models of all our best fruits, and labeling each specimen with its true name and its local names or synonyms in different sections, with the addition of facts in regard to the soils it requires, its comparative value, where it may be procured, and other items of interest, and placing them where they will be constantly studied by the inquiring cultivator, would be an object sufficient to warrant the small outlay for furnishing the room with suitable fixtures, to say nothing of the proper preservation of the invaluable collection which already belongs to the State; to say nothing, also, of the constant practical value of a complete collection of all the varieties of grasses, grains and other plants; of the birds, the fishes, and the insects injurious to vegetation. Such a collection would not be merely a matter of curiosity, but would tend to elevate the Commonwealth in the opinion of all enlightened men, be a source of just pride to the people, and the centre of attraction at the State House. I must therefore respectfully ask the legislature to authorize the furnishing of the museum room at an early day.

The operations at the State Farm have been continued as heretofore, though embarrassment has been occasioned by the insufficient appropriations made, on account, it is presumed, of a want of a full understanding of the circumstances of the case. From this cause the Board has labored under disadvantages of various kinds. Thus they have had only old and unsuitable farm implements, in many cases, to put into the hands of one hundred and fifty boys worked daily on the farm,

and have lost an exceedingly valuable fertilizer in a liquid manure which has run in such abundance that a man, boy and horse would have been constantly occupied in distributing it over the farm, had the appropriation been sufficient to allow of their employment. This liquid manure, thus applied, would give the Board the power of increasing the productions of the farm many fold, and of improving, if not enriching, the lands which were in a comparatively poor condition when its operations commenced, while its removal would be a sanitary measure of great importance to the comfort and well-being of the institution. Moreover, five or six milch cows, in addition to the present number, might be wintered without difficulty on the hay raised upon the farm ; and these cows are even now greatly needed to enable the Board to supply the school with milk, while this additional number would considerably increase the facilities for the economical management of the farm the coming year ; but the want of the means to purchase them has compelled the committee having charge of that department to defer it to a more favorable time. Judicious expenditure is true economy, but the committee did not feel authorized to incur a debt.

The year has, however, on the whole, been a prosperous one at the farm ; the crops show a considerable increase over those of former years, and the experiments, many of which will be found to be very interesting and valuable, have been continued. The reports of the committees which have had charge of special departments at the farm, will be found on a subsequent page, and contain the details of the management of the farm for the year.

It should be borne in mind that the management of the State Farm was not one of the objects originally contemplated, when the Board of Agriculture was established, and the expenses of its management are not properly a part of the legitimate expenses of the Board ; nor are they in any respect expenses incident to the establishment of the Board or to the transfer of the farm into the hands of the Board, since the actual expense of the farm to the State is no greater than it was previous to the transfer. On the contrary, it is less, and has been less every year since the operations of the Board commenced. The question of its present management was mainly a question of policy; whether it would not be more for the interest of the State that

a particular portion of State property, in the shape of a farm, should be managed by a body of men chosen almost entirely by the farmers themselves, to act for and to represent them, than by a body of men appointed for an object entirely distinct? The importance of experiment, so far as might be practicable, had, it is true, some weight in inducing the Board to assume the charge of the farm; but it was not designed to make a model or experimental farm, as that term is commonly understood; the experiments which it might be found possible to make being wholly subordinate to the chief objects for which the farm was connected with the institution, which were to supply in part the wants of the School, and to afford the means of out-door exercise for the boys, where at the same time, they might be taught the routine of farm labor. These objects have been kept constantly in view.

The appropriation made for the farm is not spent for experiment, and it might almost be said that not a dollar has ever been spent by the Board for experiment on the farm; the cost of the experiments consisting mainly in the additional care and closeness of observation which they require, the amount of which in direct expense to the State is comparatively insignificant.

The trustees of the State Reform School and the Board of Agriculture have acted in entire harmony, and in a manner believed to be most conducive to the interests of the State.

The members of the Board of Agriculture have no personal interest to serve in the management of the farm. They are not authorized by law to receive pay even for the time and labor which they devote to it.

This brief explanation seemed to be necessary, because an erroneous impression exists in the minds of some in regard to the subject.

A more complete statement of facts with regard to the original transfer, will be found in my Second and Third Annual Reports, which contain copies of the original contract and the law by authority of which it was effected.

In pursuance of the plan adopted on entering upon the duties of my office,—of making some specific subject the main topic of discussion in each of my Annual Reports,—I propose to speak

in the following pages, of the grasses, a family of plants the most extensive and the most beautiful, as well as the most important to mankind. It embraces nearly a sixth part of the whole vegetable kingdom; it clothes the globe with perpetual verdure, or adorns it at fixed seasons with a thick matted carpet of green, none the less beautiful for its simplicity, and it nourishes and sustains by far the greater part of the animals that serve us and minister to our wants.

When we consider the character of our climate, and the necessity of stall feeding during five or six months of the year, for which we are dependent mainly on the grasses, we shall see that in an economical point of view, this subject is one of the most important that can occupy the farmer's attention. We have in this State alone, according to recent official statistics, no less than 80,321 horses; 77,511 oxen and steers, and 183,010 cows and heifers; valued in the aggregate at $15,423,524; while we make annually 648,610 tons of hay, being less than a ton to the acre, valued at $8,702,917.

The annual value of the grass crop to the country, for pasturage and hay together, is not less than $300,000,000.

I shall endeavor to give a brief account of the natural history or description of all the useful grasses found in our fields and pastures, partly because it is essential to a complete understanding of the subject, and partly because there is at present no popular treatise on the subject within the easy reach of our farmers, and something of the kind is needed for reference; but I shall confine myself mainly to a plain and practical treatment of the subject, making such suggestions as I think may be useful, on the cultivation, cutting and curing of the grasses for hay, the comparative value of the different varieties, and the general management of grass lands.

This subject, familiar to me from my earliest recollection, has occupied my attention almost exclusively, during the past year. Within this period I have been able to make an extensive collection, embracing nearly all the varieties of our New England grasses, for preservation in the Agricultural Museum connected with my office. I have sought information on the subject not only from my own observations,—which have extended over every county in the State excepting one,*—but

* Dukes.

also from the statements of intelligent farmers in different parts of the Commonwealth. Many of these I have myself conversed with, while others have favored me, in writing, with the results of their own experience, from which I shall draw with a liberal hand.

The grasses are variously divided, classified and arranged. They are sometimes designated as natural or artificial; the former comprising all the true grasses,—that is, plants with long, simple, narrow leaves, each leaf having many fine veins or lines running parallel with a central prominent vein or midrib, and a long sheath (Fig. 1.) divided to the base, which seems to clasp the stem, or through which the stem seems to pass, the stem being hollow, with very few exceptions, and closed at the nodes or joints; and the latter—the artificial—comprising those plants, mostly leguminous, which have been cultivated and used like the grasses, though they do not properly belong to that family, such as the clovers, sainfoin and medic. In common language the term is often used in a sense not strictly proper, being not unfrequently applied to any herbage which affords nourishment to herbaceous animals, including, of course, not only many leguminous plants like clovers, but some others which would more properly be called forage plants.

But in botanical language, and speaking more precisely, the grasses, *Gramineæ*, embrace most of the grains cultivated and used by man, as wheat, rye, Indian corn, barley and rice, all of which will be at once recognized as having leaves and stems very similar in shape and structure to most of the plants popularly called grasses.

As the general appearance of plants is often greatly modified by climate, soil and modes of cultivation, it is important to fix upon certain characteristics which are permanent and unaltered by circumstances, by means of which the particular genus and species may be identified with ease and certainty. It is evident that these characteristics could not be simply in the leaves, or the stems, or the size of the plant, because there will be a great difference between plants growing in a poor, thin, sandy soil, and others of the same species on a deep, rich loam. Botanists have, therefore, been compelled to resort to other peculiarities to distinguish between different species; and the terms used

Fig. 2.

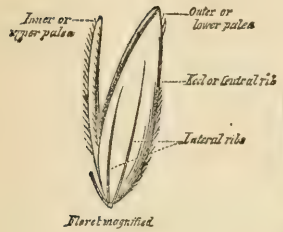


Fig. 3.

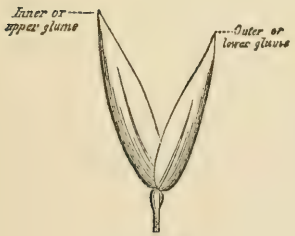


Fig. 4.

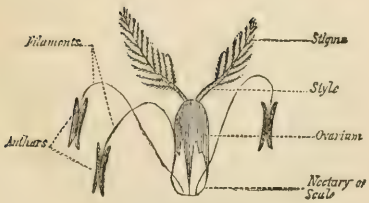


Fig. 5.

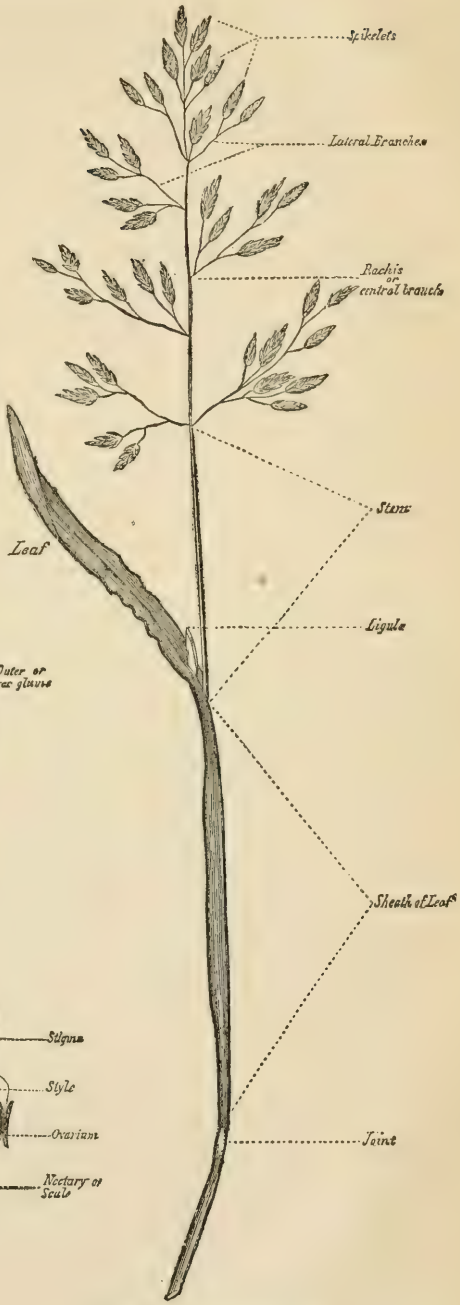


Fig. 1. Annual Spear Grass.

to express these, like the terms used in other departments of natural history, are technical; and hence, in detailing the natural history of the grasses, the use of technical language to a greater or less extent, cannot be avoided. I shall endeavor, however, by the use of plates and synonyms to bring the description of species within the easy comprehension of every one who will carefully examine the subject.

The flowers of the grasses are arranged on the stem in spikes, as where they are set on a common stalk without small stalks or branches for each separate flower, as in Herds-grass, (*phleum pratense*,) or in panicles, or loose subdivided clusters, as in orchard grass, (*dactylis glomerata.*) A panicle is said to be loose or spreading, as in redtop, (*agrostis vulgaris*,) when the small branches on which the flowers are set, are open, or extended out freely in different directions; it is said to be dense, or crowded or compressed, when the branches are so short as to give it more or less of the spike form.

The spikelets (Fig. 2) have a calyx, (Fig. 4) containing one, two or more florets, (Fig. 3.) This whole arrangement will be seen in Fig. 1, which represents a stalk of the common annual spear grass, (*poa annua*,) a plant familiar to every one as often troublesome in gravel walks and on hard, dry soils. Here the joint, the stem or culm, clasped by the sheath of the leaf, the leaf itself, the ligule and the spikelets, all distinctly appear, and the reader will do well to make himself familiar with the few technical terms used by a study of this figure, in connection with Fig. 2, where the spikelet is so magnified as to show the florets and the calyx very distinctly, all of which are generally very easily seen with the naked eye, and Fig. 3, showing a floret still more magnified, with its two paleæ, the outer palea being the longer and generally keeled,—that is, having one, three or more longitudinal ribs, often having on the back, base or summit, an awn or beard of different lengths, as in the oat and brome grasses, the inner palea with two separate fringed ribs, each on a fold at the side. The calyx, bract or outer scale of the spikelet, is shown very much magnified in Fig. 4, composed of two glumes, the upper and lower, the upper glume being the larger. One or both of the glumes are sometimes wanting.

In Fig. 5, is shown the pistil magnified, consisting of the nectary, composed of one or two fleshy scales, (in some plants

of this family both on one side, in some, entirely wanting,) and the germ, ovary, or seed bearing portion of the pistil. The stamens are also seen in the same figure, consisting each of a bag filled with a fine powder or pollen, supported upon a stalk or filament which is analagous to the stalk or stem of a leaf, while the bag which holds the pollen, called the anther, corresponds to the blade or body of the leaf. These are essential parts of the flower. At a particular stage of its growth, the anther, bursting, scatters its pollen, some of which, lighting upon the summit of the stigma, is said to fertilize it, when the new seed begins to enlarge, and a germ is formed capable of producing other plants.* This process is very apparent to the observation of the farmer in the case of Indian corn, on which the pollen is so abundant that it may be shaken off in clouds. It falls upon the stigmas or "silks," one of which is attached to each embryo seed or germ; and without this particle of pollen, the seed would not be capable of attaining maturity. The same is seen less palpably in the other grasses, as, for instance, in Herds-grass. The same arrangement occurs in this whole family of plants, though it is more evident in Indian corn, on account of its size, than in the smaller grasses. The anther, as will be seen, consists of two cells—very prominent and hanging, supported on the long, slender filaments, and forked or divided at the end. The two short and smooth styles rise from the summit of the ovary, and the stigmas are feathery or rough, sometimes branched or compound. Only one seed is contained in each ovary, and each seed is covered, when mature, with a thin husk or hull called the pericarp, which originally formed the germ or ovary; and the ripe seed or fruit is only the ovary arrived at maturity. The substance or albumen of the seed of all the grasses is mealy or farinaceous, as wheat, for instance, or rye, or Indian corn, which are most used as seeds, on account of their size and productiveness.

These are the prominent characteristics of this great and universally diffused order of plants, constituting, as it does, the chief support of animals as well as men. They belong, as has

* The germ is the first part of the seed that is distinctly formed, and hence, if Indian corn is plucked while "in the milk," or in a green state, fit for boiling, it will germinate the next year as well as if it were allowed to ripen.

been seen, to other plants than those commonly called grasses, the order gramineæ, as I have already stated, embracing the grains, as wheat, barley, rye, and many others, while it does not include the clovers, which properly belong to the order of leguminous plants.

These characteristics, or at least the most important of them, will be very easily kept in mind, as the long, narrow and lance shaped leaves, and the mealy nature of the seeds which makes nearly the whole family valuable and nutritious; but in studying the distinctive characteristics of the different species and varieties particularly valuable or interesting to an agriculturist as forage plants, it will be necessary to depend more upon the technical terms already referred to, though these will be avoided, or explained in the context as far as possible.

It will have been observed that considerable importance is given to the flowers and seeds as distinguishing characters of the grasses. It will often be found difficult from the mere external appearance of a variety of grass to determine to what species, or even to what genus it belongs, so great is the resemblance between the different species of this class of plants; but with the aid of a small magnifying glass there will very seldom be much difficulty in determining the species, especially if the plant is taken while in blossom. Indeed, it will often be possible to arrive at a conclusion from an inspection of a few of the more evident characters.

I shall limit myself mainly to a description of those species which it may be for the interest of the farmer to cultivate, or at least to encourage in his pastures, with such others as should be known to be avoided.

In the arrangement of species I shall follow mainly the natural order adopted by Professor Gray, to whom, as well as to many others, I am indebted for no small assistance, in studying the specific characteristics of many of the specimens collected and presented in the following pages.

The reader will find that a frequent reference to figures 1, 2, 3, 4 and 5 will greatly aid him in becoming familiar with the technical terms applied to the organs or parts of the flower which it is desirable to understand, and by means of which he will soon learn to distinguish the different species more readily.

In giving the scientific names, the first word that occurs in

parenthesis is the name of the genus; the second, that of the species; as for instance, in Herds-grass, (*phleum pratense.*) Phleum is the generic name, pratense the specific. A genus often contains many species.

The grasses which are described more or less minutely in the following pages, are named in

TABLE I. *List of Grasses and Forage Plants.*

Common Name.	Botanical Name.	Time of Blossoming.	Wild or Cultv'd.	Place of growth.
Rice Grass,	Leersia oryzoides,	August,	wild,	Low wet places.
White Grass,	Leersia Virginica,	August,	"	Damp woods.
Indian Rice,	Zizania aquatica,	August,	"	Borders of streams.
Meadow Foxtail,	Alopecurus pratensis,	May,	cultiv'd,	Fields and pastures.
Floating Foxtail,	Alopecurus geniculatus,	July, Aug.	wild,	Wet meadows, ditches
Slender Foxtail,	Alopecurus agrestis,	July,	"	Fields and pastures.
Wild Water Foxtail,	Alopecurus aristulatus,	June to Aug.	"	In wet meadows.
Timothy, or Herds-grass,	Phleum pratense,	June, July,	cultiv'd,	Fields and pastures.
Rush Grass,	Vilfa aspera,	September,	wild,	Dry sandy soils.
Late Drop-seed,	Sporobolus serotinus,	September,	"	Wet sands.
Redtop,	Agrostis vulgaris,	July,	cultiv'd,	Fields and pastures.
English Bent,	Agrostis alba,	July,	"	Fields and pastures.
Fiorin,	Agrostis stolonifera,	July,	"	Moist meadows.
Brown Bent,	Agrostis canina,	June, July,	– –	Fields and pastures.
Tickle Grass,	Agrostis scabra,	June, July,	wild,	Old fields.
Southern Bent,	Agrostis dispar,	July,	cultiv'd,	Fields, pastures.
Annual Beard Grass,	Polypogon monspeliensis	June, July,	wild,	Near the coast.
Wood-reed Grass,	Cinna arundinacea,	July, August,	"	Shady swamps.
Nimble Will,	Muhlenbergia diffusa,	August, Sept.	"	Dry hills, woods.
Mexican Muhlenbergia,	Muhlenbergia Mexicana,	August,	"	Low grounds.
Sylvan Muhlenbergia,	Muhlenbergia sylvatica,	August, Sept.	"	Rocky woods.
Awnless Muhlenbergia,	Muhlenbergia sobolifera,	August, Sept.	"	Open rocky woods.
Willdenow's Muhlenbergia,	Muhlenbergia Willdenovii	August, Sept.	"	Open rocky woods.
Awned Brachyelytrum,	Brachyelytrum aristatum	June,	"	Rocky woods.
Blue Joint Grass,	Calamagrostis Canadensis	July,	"	Wet grounds.
Glaucous Small Reed,	Calamagrostis coarctata,	August,	"	Wet grounds.
Beach Grass, Sea Reed,	Ammophila arundinacea,	August,	wild and cultiv'd,	Drifting sands.
Upright Sea Lyme Grass,	Elymus arenarius,	July,	cultiv'd,	Drifting sands.
Mountain Rice,	Oryzopsis melanocarpa,	August,	wild,	Rocky woods.

TABLE I.—*Continued.*

Common Name.	Botanical Name.	Time of Blossoming.	Wild or cultv'd.	Place of growth.
Feather Grass,	Stipa avenacea,	July,	wild,	Dry sandy woods.
Poverty Grass,	Aristida dichotoma,	September,	"	Sandy fields, pine barrens.
Fresh Water Cord Grass,	Spartina cynosuroides,	August,	"	Banks of streams.
Salt Reed Grass,	Spartina polystachya,	– –	"	Brackish marshes.
Rush Salt Grass,	Spartina juncea,	August,	"	Salt marches, beaches
Salt Marsh Grass,	Spartina stricta,	– –	"	Sea coast.
Sand Grass,	Tricuspis purpurea,	August, Sept.	"	Dry sands on the coast.
Orchard Grass,	Dactylis glomerata,	June,	cultiv'd,	Fields and pastures.
Pennsylvanian Eatonia,	Eatonia Pennsylvanica,	June,	wild,	Moist woods.
Rattlesnake Grass,	Glyceria Canadensis,	July,	"	Wet bogs.
Obtuse Spear Grass,	Glyceria obtusa,	August,	"	Borders of ponds.
Long Panicled Manna Grass,	Glyceria elongata,	June, July,	"	Woods and swamps.
Meadow Spear Grass,	Glyceria nervata,	June, July,	wild and cultiv'd,	Moist and wet meadows.
Pale Manna Grass,	Glyceria pallida,	July,	wild,	Shallow water.
Spike Grass,	Brizopyrum spicatum,	August,	"	Salt marshes.
June Grass,	Poa pratensis,	June, July,	cultiv'd,	Fields and pastures.
Blue Grass,	Poa compressa,	July, August,	"	Dry road sides and pastures.
Annual Spear Grass,	Poa annua,	April to Oct.	wild,	Fields and pastures.
Rough Stalked Meadow,	Poa trivialis,	July,	cultiv'd,	Fields and pastures.
Wood Meadow Grass,	Poa nemoralis,	June,	wild,	Fields and pastures.
Sea Spear Grass,	Poa maritima,	July,	"	By the sea side.
Common Manna Grass,	Poa fluitans,	June,	"	Moist and muddy ditches.
Wavy Meadow Grass,	Poa laxa,	July,	"	High rocky hills.
Water Spear Grass,	Poa aquatica,	August,	"	In wet soils.
Fowl Meadow,	Poa serotina	July & Aug.	cultiv'd,	In wet soils.
Creeping Meadow,	Eragrostis reptans,	July & Aug.	wild,	Sandy river banks.
Strong-scented Meadow,	Eragrostis poæoides,	Aug. & Sept.	"	Sandy fields, road sides.
Slender Meadow,	Eragrostis pilosa,	August,	"	Sandy and gravelly places.
Quaking Grass,	Briza media,	June,	"	Pastures.
Small Fescue Grass,	Festuca tenella,	July,	"	Dry sterile soils.
Sheep's Fescue,	Festuca ovina,	June,	cultiv'd,	High pastures and hills.
Meadow Fescue,	Festuca pratensis,	June,	"	Fields and pastures.
Tall Fescue Grass,	Festuca elatior,	June, July,	"	Fields and pastures.
Hard Fescue Grass,	Festuca duriuscula,	June,	"	Fields and pastures.
Red Fescue Grass,	Festuca rubra,	– –	wild,	Sandy places by the sea.
Slender Fescue,	Festuca loliacea,	– –	cultiv'd,	Moist meadows, pastures.

TABLE I.— *Continued.*

Common Name.	Botanical Name.	Time of Blossoming.	Wild or cultv'd.	Place of growth.
Nodding Fescue,	Festuca nutans,	July,	wild,	Rocky woods.
Crested Dog's Tail,	Cynosurus cristatus,	July,	cultiv'd,	Fields and pastures.
Willard's Bromus,	Bromus secalinus,	June, July,	"	Fields, and in grain crops.
Smooth Brome Grass,	Bromus racemosus,	June,	wild,	Grain fields.
Soft Chess,	Bromus mollis,	June,	"	Fields and pastures.
Wild Chess,	Bromus Kalmii,	June, July,	"	Dry open woods.
Fringed Brome Grass,	Bromus ciliatus,	July, Aug.	"	Rocky hills, woods.
Meadow Brome,	Bromus pratensis,	July,	"	Dry arid pastures.
Common Reed Grass,	Phragmites communis,	September,	"	Swamps and edges of ponds.
Perennial Rye Grass,	Lolium perenne,	June,	cultiv'd,	Fields and pastures.
Italian Rye Grass,	Lolium Italicum,	June,	"	Fields and pastures.
Bearded Darnel,	Lolium temulentum,	July,	– –	Grain fields.
Many-flowered Darnel,	Lolium multiflorum,	June, July,	cultiv'd,	Fields and pastures.
Couch, or Twitch Grass,	Triticum repens,	June, July,	wild,	Fields and pastures.
Squirrel-tail Grass,	Hordeum jubatum,	June,	"	Salt marshes.
Lyme Grass,	Elymus Virginicus,	July & Aug.	"	Banks of rivers.
Canadian Lyme Grass,	Elymus Canadensis,	August,	"	River banks.
Slender Hairy Lyme,	Elymus striatus,	July,	"	River banks.
Bottle-brush Grass,	Gymnostichum Hystrix,	July,	"	Moist rocky woods.
Wood Hair Grass,	Aira flexuosa,	June,	"	Dry rocky hills.
Hassock Grass,	Aira cæspitosa,	June, July,	"	Marshy wet bottoms.
Wild Oat Grass,	Danthonia spicata.	June,	"	Dry pastures.
Downy Persoon,	Trisetum mollis,	July,	"	Rocky river banks.
Downy Oat Grass,	Trisetum pubescens,	July,	"	Poor dry pastures.
Meadow Oat Grass,	Avena pratensis,	July,	"	Pastures.
Yellow Oat Grass,	Avena flavescens,	July,	cultiv'd,	Fields and pastures.
Tall Meadow Oat Grass,	Arrhenatherum avenaceum,	May, June,	"	Fields and pastures.
Meadow Soft Grass,	Holcus lanatus,	June,	"	Fields and pastures.
Creeping Soft Grass,	Holcus mollis,	– –	wild,	Fields and pastures.
Seneca Grass,	Hierochloa borealis,	May,	"	Wet meadows.
Sweet-scented Vernal,	Anthoxanthum odoratum	May, June,	"	Fields and pastures.
Reed Canary Grass,	Phalaris arundinacea,	July,	"	By running streams.
Common Canary Grass,	Phalaris Canariensis,	July, August,	cultiv'd,	Gardens.
Millet Grass,	Millium effusum,	June,	wild,	Damp cold woods.
Hairy Slender Paspalum,	Paspalum setaceum,	August,	"	Sandy fields by the sea.
Slender Crab Grass,	Panicum filiforme,	August,	"	Dry sands on the coast.

TABLE I.—*Continued.*

Common Name.	Botanical Name.	Time of Blossoming.	Wild or cultv'd.	Place of growth.
Smooth Crab Grass,	Panicum glabrum,	August, Sept.	wild,	Fields and waste places.
Finger Grass,	Panicum sanguinale,	Aug. to Oct.	"	Neglected fields and gardens.
Agrostis-like Panic,	Panicum agrostoides,	July, August,	"	Wet meadows and river banks.
Prolific Panic Grass,	Panicum proliferum,	July, August,	"	Brackish marshes.
Hair Stalked Panic,	Panicum capillare,	August, Sept.	"	Dry sandy fields.
Tall Smooth Panic,	Panicum virgatum,	August,	"	Moist sandy soils.
Broad-leaved Panic,	Panicum latifolium,	June, July,	"	Damp thickets.
Barn Grass,	Panicum crus-galli,	August, Sept.	"	Rich cultivated grounds.
Bristly Foxtail,	Setaria verticillata,	– –	"	About farm-houses.
Bottle Grass,	Setaria glauca,	July,	"	Fields & barn-yards.
Green Foxtail,	Setaria viridis,	– –	"	Cultivated fields.
Bengal Grass,	Setaria Italica,	– –	cultiv'd,	Fields.
Bur Grass,	Cenchrus tribuloides,	August,	wild,	Sands near the coast.
Gama Grass,	Tripsacum dactyloides,	August,	"	Moist places on the coast.
Finger-spiked Wood,	Andropogon furcatus,	September,	"	Sterile, rocky hills.
Purple-wood Grass,	Andropogon scoparius,	July to Sept.	"	Sterile, sandy plains.
Indian Grass,	Sorghum nutans,	August,	"	Dry soils.
Indian Millet,	Sorghum vulgare,	– –	cultiv'd,	Cultivated fields.
Hungarian Millet,	Panicum germanicum,	– –	"	Cultivated grounds.
Chinese Sugar Cane,	Sorghum saccharatum,	July,	"	Fields and gardens.
Red Clover,	Trifolium pratense,	June, July,	"	Fields and pastures.
White Clover,	Trifolium repens,	May to Sept.	"	Fields and pastures.
Lucern,	Medicago sativa,	June, July,	"	Fields and pastures.
Sainfoin,	Hedysarum onobrychis,	June, July,	"	Cultivated fields.

RICE GRASS, CUT GRASS, FALSE RICE, (*Leersia oryzoides*,) grows very common in wet swampy places. Stems from two to three feet high, panicle erect, spreading with rough, slender branches, leaves narrow or long, sheaths exceedingly rough and sharp to the hand, drawn from the end backward. Florets oval and white, spikelets flat. Flowers in August. Native of the Levant. Name from Leers, a German botanist.

It is a beautiful grass, said to be useful at the South, where it is cultivated to some extent, and may be cut several times in a season. It is said there to make a valuable hay. Here it is regarded as a weed, and thorough draining will destroy it. The

fine specimens of this grass in the State cabinet, were obtained at Westborough.

White Grass, Virginian Cut Grass, (*Leersia virginica*,) is rather smoother than the preceding; panicle oblong, spiked, flowers considerably smaller—white; found in damp woods. Flowers in August. Native of North America.

Indian Rice, or Water Oats, (*zizania aquatica*,) is also found in swampy borders of streams, in shallow water, and on the borders of ponds, and is common. It grows from three to nine feet in height, with flat, long, lanceolate leaves. Flowers in August, and drops its seed, when ripe, at the slightest touch. This furnishes food for water fowls, and was also used by the aborigines for food. Native of North America.

Meadow Foxtail, (*alopecurus pratensis.*) Generic characteristics: Spikelets, one flowered, glumes compressed and keeled, united at the base, lower palea awned on the back, upper palea wanting, stamens three, styles generally united, stigmas long, panicle compressed into a cylindrical spike like the tail of a fox, from which it derives its name. Native of Great Britain.

The specific characters are, an erect, smooth stem, two or three feet high, with swelling sheaths, spikes cylindrical, obtuse, equalling the sharp cone-like glumes, awn twisted and twice the length of the blossom. The spike not so long as that of Timothy. Flowers in May, in fields and pastures. Perennial—introduced. Fig. 6 shows the root, stem or culm, and spike of this grass, and Fig. 7 the blossom somewhat magnified.

The meadow foxtail closely resembles Herds-grass, but may be distinguished from it as having one palea only. The spike or head of meadow foxtail is soft, while that of Timothy or Herds-grass is rough. It flowers earlier than Timothy, and thrives on all soils except the dryest sands and gravels. It is common in some sections of this State, as the western part of Worcester County, where it is disliked by many farmers as a field grass, being very light in proportion to its bulk.

It is a valuable grass for pastures, on account of its early and rapid growth, and of its being greatly relished by stock of all kinds. The stems and leaves are too few and light to make it so desirable as a field crop. It thrives best on a rich, moist, strong soil, and the quantity of its nutritive matter when

Fig. 6. Meadow Foxtail.

Fig. 7.

raised on such soils is considerably greater than on sandy soils. As a pasture grass, its luxuriant aftermath, being in value nearly one-fourth greater than its first spring growth, recommends it still more highly. In this respect it is superior to Timothy, the aftermath of which is generally but slight. For lands designed to be laid down to permanent pasture it will make a prominent part of the seed. Where it occurs in fields, it loses largely its nutritive value if cut in the blossom. It is regarded in England as one of the most valuable of the native pasture grasses, forming there a very considerable portion of the sward, vegetating with great luxuriance, and starting up vigorously when eaten off by stock, producing seed in abundance, and enduring any amount of forcing and irrigation. It does not acquire its full perfection and hold of the soil until three or four years after being sown. The aftermath exceeds the flowering crop in quantity as well as in nutritive matter. The grass loses seventy per cent. of its weight in drying, and the hay contains about sixty-seven hundredths per cent. of nitrogen.

The seed of meadow foxtail is covered with the husks of the flower, soft and woolly, while the larger valve is furnished with an awn. There are five pounds of seed in a bushel, and 76,000 seeds in an ounce. An insect attacks the seed while it is forming, and it is also subject to blight, and hence the seed is somewhat difficult to procure and is held at a high price. We have many grasses superior to it for cultivation, but for permanent

pastures it is superior to Timothy, which is not a suitable pasture grass.

Slender Foxtail, (*alopecurus agrestis.*) (Fig. 8.) This grass is rarely found here, never, indeed, except when intro-

Fig. 8. Slender Foxtail.

Fig. 9.

Fig. 10.

Fig. 11. Floating Foxtail.

Fig. 12.

duced in foreign seed, and therefore, scarcely deserves a detailed description. It is recognized by its long, slender panicle, tapering at each end, and the long awn which projects far beyond

the palea, (Figs. 9 and 10.) It is distinguished from the common meadow foxtail by its slender panicle, its larger spikelets, its larger ligule and the roughness of the stem and leaves. It possesses no particular agricultural value. Flowers in July. Annual. Native of Great Britain.

Floating Foxtail, (*alopecurus geniculatus.*) Stem ascending, bent and forming knees at the lower joints, as shown in Fig. 11; awn projecting beyond the palea, (Fig. 12,) which is rather shorter than the obtuse glumes; anthers linear, upper leaf as long as its sheath; root perennial, fibrous, joints smooth, long and narrow, of a purple tinge; leaves flat, sharp, roughish on both sides, serrated on the edge. Inflorescence simple panicled; spikelets numerous, compressed, erect, with a one awned floret as large as the calyx. Floret of one palea, awn slender. Found in moist meadows, ditches, ponds and slow streams, floating on the water. It is distinguished from meadow foxtail in having the upper sheath about the length of its leaf, and by the projecting awn, while in the meadow foxtail the upper sheath is more than twice the length of its leaf. Flowers in July and August.

It is a grass not much relished by stock of any kind, while it yields but a small amount of herbage.

The Wild Water Foxtail, (*alopecurus aristulatus*,) also grows in wet meadows, but is of no special agricultural value. Native of Great Britain.

Timothy, or Herds-grass, (*phleum pratense*,) Generic characters: Panicle spiked, spikelets compressed, palea shorter than the awned glumes, the lower one truncate, usually awnless; styles distinct, filaments hairy, spike dense, rough, or harsh. So called from an ancient Greek term signifying cat's tail, the name by which it is still most frequently known in Great Britain.

Specific characteristics: Spikes cylindrical or elongated; glumes hairy on the back, tipped with a bristle less than half their length; leaves long, flat, rough, with long sheaths; root fibrous, often bulbous—perennial. Grows best on moist, peaty soils. (Fig. 13.) In Fig. 14 is seen a flower somewhat magnified. This grass—universally known and highly valued among the farmers of New England—is said to have received its name more than a century and a half ago from one Herd, of Piscataqua, who is said to have found it growing in a swamp there.

The name of Timothy, by which it is more generally known over the country and abroad, was obtained from Timothy Hanson, who cultivated it extensively, and according to some accounts, introduced it into England, from whence it is supposed to have been originally brought to this country. It forms a large proportion of what is called English hay. In point of nutritive matter, Sinclair says, the ripe crop greatly exceeds the crop at the time of flowering. If this is so, it is owing in part to the size and quantity of its mealy seeds. As many as thirty bushels, of forty-six pounds to the bushel, have been obtained to the acre.

Fig. 13. Timothy, or Herds-grass.

Fig. 14.

The results obtained by Prof. Way will be found on a subsequent page in the discussion upon the nutritive values of the various grasses. It may be remarked, in passing, that there are many considerations to determine the time of cutting and curing grass, besides its nutritive value at different stages of its growth, as its palatability at the time of blossoming, and the greater growth of aftermath which is lost by allowing the grass to ripen. This subject will form the topic of a subsequent section.

As a crop to cut for hay it is probably unsurpassed by any other grass now cultivated. Though somewhat coarse and hard,—especially if allowed to ripen its seed, yet if cut in the blossom, or directly after, it is greatly relished by all kinds of stock, and especially so by horses, while it possesses a large per-

centage of nutritive matter in comparison with other agricultural grasses. It is often sown with clover, but the best practical farmers are beginning to discontinue this practice, on account of the different times of blossoming of the two crops. Timothy being invaribly later than clover, the former must be cut too green, before blossoming, when the loss is great by shrinkage, and when the nutritive matter is considerably less than at a little later period, or the clover must stand too long, when there is an equally serious loss of nutritious matter in that. It thrives best on moist, peaty or loamy soils of medium tenacity, and is not suited to sandy or light gravelly lands; for though on such soils, by great care it can be made to grow and produce fair crops, some other grasses are better suited to them and more profitable. It grows very readily and yields very large crops on favorable soils. I have known instances where its yield was four tons to the acre of the best quality of hay, the Timothy constituting the bulk of the grass. It is cultivated with ease, and yields a large quantity of seed to the acre, varying from ten to thirty bushels on rich soils.

In one respect, perhaps, it must be admitted that this grass is inferior to meadow foxtail, and that is in the quantity of its aftermath; for while that of the latter is very great, the aftergrowth of Timothy is but slight, and if allowed to stand too long and then mown in a dry time, it starts so slowly as to leave the ground exposed to the scorching rays of the sun, unless indeed there happens to be a rapid growth of clover to protect it. The comparative value of this grass will be referred to hereafter. It is proper to say in this connection that it is frequently attacked by an insect apparently just before the time of blossoming, which causes the stalk to die. The ravages of this insect seem to have increased within the last few years. My attention has been repeatedly called, by observing and practical farmers, during the last few months, to the very large number of dead Herds-grass stalks.

Rush Grass, or Rough Leaved Vilfa, (*vilfa aspera*,) and Hidden Flowered Vilfa, (*vilfa vaginæflora*,) are sometimes found here; the former, rarely on dry hills and sandy fields, or pine plains; the latter, somewhat more frequently on similar soils and situations, both flowering in September, and neither considered of any value for cultivation. The Late

Flowering Vilfa, (*vilfa serotina*,) is somewhat common in sandy swamps. It is a very delicate grass, flowering at the same time with the preceding.

Late Drop Seed, (*sporobolus serotinus*,) is sometimes found in low, swampy places, with smooth, slender, flatish stems, leaves few and slender, panicle spreading, with hairy branches, glumes ovate, obtuse and half the length of the palea. Flowers in September. It is a delicate grass of no special agricultural value.

Redtop, Finetop, Burden's Grass, Dew Grass, Herds-Grass of Pennsylvania and Southern States, (*agrostis vulgaris*,) Fig. 15. Plants of this genus have one flowered spikelets in a loose open panicle; glumes nearly equal, the lower longer than the paleæ, which are thin and naked; stamens three—perennial.

The specific characters are, stems erect, slender, round, smooth and polished; roots creeping, panicle oblong, leaves linear, ligule very short, lower palea mostly awnless and three nerved. Flowers in July. Pastures and moist meadows very common—introduced. The term agrostis was the ancient Greek word for field, and was applied to all varieties of grass that grew there.

This valuable grass, so common in all our cultivated fields, has been an inhabitant of our soils for more than a century. It was called simply English grass by Eliot, Deane and other early writers, and by the English, Fine Bent. Indeed, the whole genus *agrotis* is commonly known in England as "Bent Grass." This grass is often sown with Timothy and clover, in which case, the clover, of course, soon disappears, being biennial, when Timothy follows, after which redtop usually takes its place, and with some wild grasses forms a close sward. In Pennsylvania and States further south, it is universally known as Herds-grass—a name applied in New England and New York to *phleum pratense* alone. It is of somewhat slow growth, but of good or medium quality. It is suited to moist soils, though common to all. This grass is probably rather overrated by us. It makes a profitable crop for spending, though not so large a crop is obtained as from Herds-grass. It is a good permanent grass, and consequently well suited to our pastures, standing our climate as well as any other grass. It should be fed close in pastures, for if allowed to grow up to

Fig. 15. Redtop.

seed the cattle refuse it; and this fact seems to show that it is not so much relished by stock as some of the other pasture grasses. The fact that cattle eat any grass greedily in the spring, is no proof of its excellence or nutritious qualities; since, then, all grasses are tender and full of juice, and many varieties of both grasses and shrubs are readily eaten which at a more advanced stage of growth are refused. It is to be regretted that Prof. Way, in his valuable investigations into the nutritive value of the grasses, did not include this in the list analyzed by him. At present we have no accurate and reliable means of comparison of this with other species of grass. The flower of the true redtop is seen magnified in Fig. 16.

This grass goes by various names, and is greatly modified by soil and cultivation. On a moist, rich soil it grows larger than on a poor, thin soil, and not only larger but has a darker, purplish color, with a stem varying from eighteen inches to two feet or two and a half feet high; while on thin, poor, gravelly soils, it seldom grows over twelve inches, and often not over five or six inches high, while it has a lighter color. In the latter situations it goes by the name of Finetop, and is universally seen in old, dry pastures. In some sections of the State, as in Bristol County, it goes by the name of Burden's or Borden's grass, or Rhode Island Bent, and is highly esteemed.

Fig. 16.

Finetop may be regarded as a variety of redtop, produced by the character of the soil.

Dew Grass, White Top, White Bent, English Bent, Bonnet Grass, (*agrostis alba.*) Generic characters same as those of redtop.

Specific characters: Stem erect, round, smooth, polished, having four or five leaves with *roughish* sheaths, striated, upper sheath longer than its leaf, crowned with a long, acute, ragged ligule; joints smooth, branches numerous, recumbent, rooting at the lower joints where they come in contact with the ground, as in Fig. 17; panicle somewhat narrower than in redtop, lightish green, or with a slight tinge of purple; lower or inner palea one-half the length of the upper, and shorter than the glumes; five nerved, awnless—perennial. Native of Europe.

White top may be known from redtop by the sheaths being rough to the touch from above downwards, and the ligule being long and acute, and the keel of the large glume of the calyx toothed nearly to the base. In *agrostis vulgaris* the sheaths are smooth, ligule short and obtuse, and the keel of the large glume toothed only on the upper part.

It may be known from Brown Bent, (*agrostis canina,*) by having an inner palea in its floret, while in brown bent the inner palea is wanting. This grass is very common on the Connecticut River meadows where it appears to be indigenous, and is there called the English bent. Fiorin, (*agrostis stolonifera,*) is only a variety of the white top, or *agrostis alba*, which gained great notoriety some years ago in Ireland and England, volumes having been written in its praise, while it received the execrations of those who found it troublesome to eradicate on account of its creeping and stoloniferous roots. This grass belongs peculiarly to moist places which are occasionally overflowed. Fig. 17 represents it, and Fig. 18, a magnified flower. This grass is often used in the manufacture of bonnets. It is called Dew grass in some sections.

Brown Bent, or Dog's Bent Grass, (*agrostis canina,*) another variety of *agrostis*, has for its specific characters, a floret of one palea, sheaths smooth, ligule long, and grows from one to two feet high, awnless. The root is perennial and creeping. The stem is erect, slender, leaves flat and linear. The palea shorter than the glume and furnished with a long awn on the back, bent; spikelets at first greenish, afterwards brown or slightly purple. Meadows and pastures, and wet, peaty

Fig. 17. English Bent.

places—introduced. Flowers in June and July. It is of no special agricultural value.

Hair Grass, or Fly Away Grass, Tickle Grass, (*agrostis scabra,*) is another species belonging to this genus, with a panicle very loose and spreading, *purplish*. Flowers in June and July. Mainly remarkable for the long hairy branches of its extremely loose panicle. Common in old fields and drained swamps. It is of no particular agricultural value. Very common at the West, in Ohio, Illinois, Michigan, and about Lake Superior. The large, loose panicles are exceedingly delicate and brittle when the plant is ripe and dry, and easily break away from the stalk when they are blown about by the wind, scattering their seeds far and wide; and hence it is frequently called "Fly Away Grass." This illustrates one of the admirable contrivances of nature for the distribution of the seeds of grasses and other plants; sometimes by means of birds, sometimes by a sort of wing attached to the light seed, and sometimes by the force of the wind alone, as in this case, when plants start up where no seed had been sown by the hand of man, and often to our astonishment.

Fig. 18.

Thin Grass, (*agrostis perennans,*) is still another variety of agrostis, with a panicle diffusely spreading, pale green; branches short, divided and flower-bearing from or below the middle; found in damp, shaded places. Flowers in June and July.

The Alpine Brown Bent, the Upright Flowered Bent, and many other species of agrostis might be mentioned. Of all the species of this genus, the redtop and white top are the most common as agricultural grasses among us.

The Fiorin, (*agrostis alba*, var., *stolonifera latifolia*,) or Broad Leaved Creeping Bent, has been more highly commended in Europe than either of these. In the Woburn experiments which will be alluded to, this last was found to be inferior in nutritive value to orchard grass and meadow fescue, (*festuca pratensis*,) and superior to meadow foxtail (*alopecurus pratensis*.)

The Southern Bent, (*agrostis dispar*,) (Fig. 19,) has been highly extolled in France. It is a native of the United States; was at one time highly commended in England, but was very soon discarded. It furnishes a hay of rather coarse quality, yields a large produce on good, deep sands and calcareous soils. It tillers very much, and when once rooted is very vigorous and lasting, and consequently makes a good pasture grass. It is very similar in appearance to some of the broad leaved varieties of *agrostis vulgaris*, and is said to yield a larger produce than that commonly known as redtop. It has stronger and more numerous creeping roots,

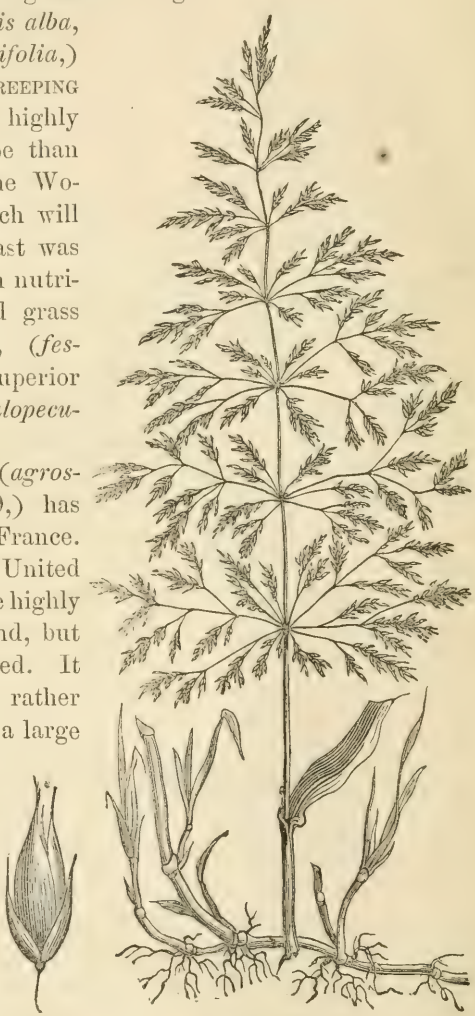


Fig. 19. Southern Bent.

Fig. 20.

broader leaves and more upright leafy stems. It is most frequently met with in the Southern States and in the south of France. Fig. 20 represents the flower of this grass magnified.

Annual Beard Grass, (*polypogon monspeliensis*,) is a grass which is occasionally found near the coast. It may be known by having glumes with awns more than twice their length, growing from ten to fifteen inches high; stem erect, round, and a little rough; five or six leaves, flat, rather broad and acute; panicle dense, spikelets one flowered—introduced. It is easily distinguished from other grasses by the length of its awns or beards. Of no agricultural value.

Wood Reed Grass, Indian Reed, Reedy Cinna, (*cinna arundinacea*,) has spikelets, one flowered, feathered; glumes lanceolate, acute, strongly keeled, paleæ like the glumes, short awned—perennial; stems erect and reed like, three or four feet high. The spikelets are green, or of a slight purplish tinge. Moist woods and swamps, common. Flowers in July and August. Panicle large, hairy, rather dense. A large, rank grass, differing from others in having but one stamen in each flower. Of no special agricultural value.

Drop Seed Grass, (*Muhlenbergia diffusa*,) is a grass which derives its generic name from Dr. Henry Muhlenberg, a distinguished American botanist, pupil of the great Linnæus. It is commonly known in Kentucky and Tennessee by the name of "Nimble-will," and there forms a pasture grass of some value. Its stems are diffusely branched, from ten to eighteen inches high; panicles slender, contracted, glumes minute, awn nearly twice as long as the palea. It is sometimes found on dry hills and in woods. Flowers in August and September—perennial. Cattle eat it very readily. Not very common.

There is another species of this grass, the *Muhlenbergia glomerata*, from one to two feet high, much more common than the preceding, with stems upright, somewhat branched; panicle oblong, linear, contracted into an interrupted glomerate spike, with long peduncles or flower stalks and awned glumes—perennial. Flowers in August and September. Common in swamps and low grounds. Of no agricultural value.

The Erect Muhlenbergia, or Awned Brachyelytrum, (*Muhlenbergia erecta*,) is often found in rocky woods, on the sides of Wachuset Mountain, and many other similar situations.

It is a simple, slender grass, two or three feet high; flowers few, root perennial, creeping, sheaths downy, leaves broad and flat, lanceolate, pointed. Flowers in June.

The Mexican Muhlenbergia, (*Muhlenbergia Mexicana*,) another species of this genus, has been mistaken by some for our fowl meadow. It has an erect stem, two to three feet high, much branched; panicles lateral and contracted, branches densely spiked and clustered, green or purplish; glumes pointed, awnless and unequal. It is perennial. Flowers in August. Frequently regarded as a troublesome weed in low grounds; somewhat common at the West and frequent here in low grounds, the borders of fields, and even in gardens, where its spreading roots are difficult to eradicate. Cattle eat it very readily, and as it blossoms late in the season, it is of some value.

The Sylvan Muhlenbergia, (*Muhlenbergia sylvatica*,) is also rather common in low, rocky woods. Its stem is ascending, branched, spreading diffusely; panicles contracted, densely flowered; glumes nearly equal, bristle pointed, lower palea one awned, twice or three times the length of the spikelets. Flowers in August and September.

The Awnless Muhlenbergia, (*Muhlenbergia sobolifera*,) is sometimes found in open, rocky woods, from New England to Michigan, and farther south. It grows from one to two feet high, with a simple contracted panicle, very slender; glumes long, pointed, nearly equal, root perennial, creeping, woody, leaves pale green, sheaths open, ligule wanting. Flowers in August and September.

Still another species, sometimes called Hair Grass, (*Muhlenbergia capillaris*,) is sometimes, though not often found on sandy soils.

Willdenow's Muhlenbergia, (*Muhlenbergia Willdenovii*,) is also not uncommon in rocky woods, growing about three feet high, with a slender, simple stem, contracted panicle, loosely flowered, glumes sharp pointed, half as long as the lower palea, which has an awn from three to four times the length of the spikelet.

None of the grasses of this American genus are of great value as agricultural grasses, except as they add considerably to the mass of living verdure which clothes our low lands in

beauty to delight the eye and swell the heart of the lover of nature.

Blue Joint Grass, (*calamagrostis canadensis.*) The generic characteristics are, one flowered spikelets, open panicle, contracted or spiked; glumes keeled, about equal to the paleæ, around which, at the base, is a thick tuft of white bristly hairs; lower palea generally with a slender awn on the back.

Specific description: Stems three to five feet high, greyish, leaves flat, panicle often purplish, the glumes acute, lanceolate, lower palea not longer than the very fine hairs bearing an extremely delicate awn below the middle, nearly equal to the hairs. Flowers in July. The blue joint grass is very common on low grounds. It is generally considered a valuable grass. It is eaten greedily by stock in the winter, and is thought by some to be as nutritious as Timothy.

The Glaucous Small Reed, (*calamagrostis coarctata,*) is also somewhat common in our wet meadows, open swamps and along low river banks. Its stems are from three to five feet high, seed hairy, crowned with a bearded tuft; lower palea shorter than the taper-pointed tips of the lanceolate glumes, almost twice the length of the hairs, with a rigid, short awn above the middle.

Beach Grass, Sea Sand Reed, Mat Grass, (*ammophila arundinacea,*) grows to a height of two or three feet, with a rigid culm, from stout roots running often to the distance of twenty or thirty feet; leaves wide, rather short, of a sea green color; panicle contracted into a close, dense spike, from six to twelve inches long, nearly white. It is found in the sands of the sea shore where its thick, strong, creeping, perennial roots, with many tubers the size of a pea, prevent the drifting of the sand from the action of the winds and waves, thus forming a barrier against the encroachments of the sea.

This grass is very generally diffused on sea coasts over the world, and is found inland on the shores of Lake Superior. It has also been cultivated by way of experiment, and with success, on the sands at Lowell, and still farther up on the banks of the Merrimack River. Though not cultivated for agricultural purposes, it is of great value in protecting sandy beaches. It is preserved in England and Scotland by act of parliament. Flowers in August.

In the year 1853, I was requested by the late T. W. Harris, to make this grass a special study in the course of my observations, and since that time I have tried in every way, by personal inquiries and by correspondence, to collect whatever there might be of interest in relation to it.

The town of Provincetown, once called Cape Cod, where the Pilgrims first landed, and its harbor, still called the harbor of Cape Cod,—one of the best and most important in the United States,—sufficient in depth for ships of the largest size, and in extent, to anchor three thousand vessels at once, owe their preservation to this grass. To an inhabitant of an inland country, it is difficult to conceive the extent and the violence with which the sands at the extremity of Cape Cod are thrown up from the depths of the sea, and left on the beach in thousands of tons by every driving storm. These sand hills when dried by the sun are hurled by the winds into the harbor and upon the town. A correspondent at Provincetown says: "Beach grass is said to have been cultivated here as early as 1812. Before that time, when the sand drifted down upon the dwelling-houses,—as it did whenever the beach was broken,—to save them from burial the only resort was to wheeling it off with barrows. Thus tons were removed every year from places that are now perfectly secure from the drifting of sand. Indeed, were it not for the window glass in some of the oldest houses in these localities, you would be ready to deny this statement, but the sand has been blown with such force, and so long against this glass as to make it *perfectly ground.* I know of some windows through which you cannot see an object, except to remind you of that passage where men were seen 'as trees walking.'"

Congress appropriated, between the years 1826 and 1839, about twenty-eight thousand dollars, which were expended in setting out beach grass back of the village, for the protection of the harbor. From the seed of this grass it is estimated that nearly as much ground has become planted with it as was covered by the general government. In 1854, five thousand dollars were expended most wisely by the general government in adding to the work so nobly begun; and the experience of former years was of great value to the efficiency of this latter effort. The work of fortification or protection is not yet com-

plete. The eastern part of the harbor is much exposed to injury from the sand which now empties itself by the thousand tons every north wind, into the east harbor. Unless there is speedily another appropriation from congress, to be applied in the direction of East Harbor, it is easy to foretel the fearful consequences to it.

"It may be proper to state," says the same writer, "that this town does much in the way of '*beach grassing*' by its '*beach grass committee*,' whose duty it is to enter any man's enclosure, summer or winter, and set out grass, if the sand is uncovered and movable. By this means we are now rid of sand storms, which were once the terror of the place, being something like snow storms, for drifts which were to be removed. Our streets are now hardened with clay which has been imported, and instead of its being buried, as it would once have been in a few days, I notice that the surveyors have to resort to sprinkling it with sand in wet weather, so effectually has the culture of beach grass answered its end.

"The mode of culture is very simple. The grass is pulled up by hand and placed in a hole about a foot deep, and the sand pressed down about it. These holes are dug about one foot and a half apart. The spring is the usual time of planting, though many do this work in the fall or winter. The roots of the grass from which it soon covers the ground, are very long. I have noticed them ten feet, and I suppose upon high hills they extend down into wet sand."

Many years ago the beach which connects Truro and Provincetown was broken over, and a considerable body of it swept away. Beach grass was immediately planted, and the beach was thus raised to sufficient height, and in some places into hills. The operation of it is like that of brush or bushes, cut and laid upon the ground, in accumulating snow in a drifting wind. The sand is collected around the grass, and as the sand rises, the grass also rises to overtop it, and will continue to grow, no matter how high the sand hill may rise, and this process goes on over the whole surface of the plantation, and thus many acres have been raised far above their original level.

A committee of the legislature appointed in 1852, to inquire into the means of preserving Cape Cod Harbor, in speaking of the beach between the ocean on the north, and the channel of

East Harbor,—and which is all that prevents the sea from breaking over into Cape Cod Harbor,—say: "This tract consists of loose sand, driven about by every high wind, which throws it up in heaps like snow drifts. The wind, from any point from north-east to north-west, drives the sand directly from said beach into the channel of East Harbor, and is carried by a strong current into the north-east part of Cape Cod Harbor. The ocean on the north is wasting this narrow beach away in every storm, and the current in East Harbor channel undermining and destroying it on the south. The decay of said beach has been on the increase for several years; it has narrowed within seven or eight years, by the tide that runs through East Harbor channel, from eight to ten rods; where the mail stage travelled only one year since, is now the channel, with six feet of water at low tide, and from twelve to fourteen feet at high water."

The first effort made by the State for the preservation of this important harbor appears to have been in 1714. The town was incorporated in 1727, and was at that time a place of some extent, but the inhabitants soon began to leave, and in less than twenty years it was reduced to two or three families. After the Revolution the place revived, and is now a thriving town.

The object of the law of 1714 was to arrest the destruction of the trees and shrubbery on the province lands, and on the preservation of which it was thought the harbor depended, as they prevented the drifting of the sand.

In 1824 commissioners were appointed by the State government to examine the subject and report what action was necessary to prevent the rapid destruction of the harbor. They recommended an act to prevent the destruction of beach grass, and reported that the sum of thirty-six hundred dollars would be necessary to set out that plant, make fences, &c. The legislature in 1826 applied to congress for that sum, and congress has, at different times, made appropriations to the amount of about thirty-eight thousand dollars, which seems to have failed in some measure to accomplish the object intended, and East Harbor is still rapidly filling up.

Many years ago it was as customary to warn the inhabitants of Truro and some other towns on the Cape every spring, to

turn out to plant beach grass, as it was in the inland towns to turn out and mend the roads. This was required by law, with suitable penalties for its neglect, and took place in April.

A farmer of much practical knowledge of this subject, says: "Since the cattle have been kept from the beaches, by the act of the legislature of 1826, the grass and shrubs have sprung up of their own accord and have, in a great measure, in the westerly part of the Cape, accomplished what was intended to be done by planting grass. It is of no use to plant grass on the high parts of the beach. Plant on the lowest parts and they will raise, while the highest places, over which the grass will spread, are levelling by the wind. To preserve the beach it must be kept as level as possible.

"Beach grass is of but little value except to prevent our loose, sandy beaches from being drifted about by the wind. We have but one species, and this is fast spreading over our upland, making it useless for cultivation. Land that would produce from twenty to twenty-five bushels of Indian corn to the acre, without any manure, twenty-five or thirty years ago, is now overrun with beach grass and will produce nothing else. If the dead grass is burnt off in the spring, it will make a pretty good pasture for cattle and horses. It keeps green longer than any other grass we have. It can be cultivated from the seed or by transplanting. Our loose, sandy beaches are the most suitable for its growth."

Beach grass seems to require the assistance of some disturbing causes to enable it to attain its full perfection. The driving winds in some localities, are sufficient, while in other places, where it does not thrive so well, it is probable that an iron tooth harrow would greatly improve and aid its growth. It has been extensively cultivated or propagated from the seed on many parts of Cape Cod, on Nantucket, and in fact to considerable extent all along our coast. It comes in of itself along Nantasket beach from seed borne by the tides, probably, from the Cape. It has been extensively used, at times, in this country, for the manufacture of coarse paper, though if I am rightly informed, its manufacture has been discontinued in this State. In other countries it is manufactured into door mats and brushes, mats for pack-saddles, meal bags and hats, and into ropes for various purposes.

Mountain Rice, (*oryzopsis melanocarpa*,) is a grass common in rocky woods; the large white grained mountain rice, (*oryzopsis asperifolia*,) common on steep and rocky hill-sides and dry woods, and the Smallest Oryzopsis, (*oryzopsis canadensis*,) are sometimes found. These grasses are easily distinguished from each other. The first has an awn thrice the length of the blackish palea; the second, an awn two or three times the length of the whitish palea; the third, an awn short, deciduous or wanting. The first grows from two to three feet high, the second from ten to eighteen inches.

Feather Grass, or Black Oat Grass, (*stipa avenacea*,) is sometimes met with in dry, sandy woods, and is collected for vases and ornaments, but is of no agricultural value. It rises from one to two feet; its panicle is open, leaves almost bristle form, palea blackish, nearly as long as the almost equal glumes, awn bent above, twisted below. Flowers in July.

Poverty Grass, or Three Awned Grass, (*aristida dichotoma*,) and Slender Three Awned Grass, (*aristida gracilis*,) are found in old, sandy fields, dry, sterile hill-sides and pine barrens, but are of no value for cultivation. One or two other species of three awned plants also occur on similar soils, as the *aristida purpurascens* and the *aristida tuberculosa*. None of these species are of importance in agriculture.

Fresh Water Cord Grass, (*spartina cynosuroides*.) This is found on the banks of streams and lakes, rising to the height of from two to four feet, with slender culm, narrow leaves two to four feet long, tapering to a point, and spikes of a straw color. Flowers in August.

The Salt Reed Grass, (*spartina polystachya*,) has a stout culm from four to nine feet high, broad leaves, roughish underneath and on the margins; spikes 20 to 50 in number, forming a dense, oblong, purplish cluster. It is found on the salt marshes.

Rush Salt Grass, (*spartina juncea*,) grows from one to two feet high, stems slender, leaves narrow, rush-like, and very smooth. It is common on salt marshes and sandy sea beaches, and flowers in August.

Salt Marsh Grass, (*spartina stricta*, var. *glabra*,) grows from two to four feet high, has from five to twelve spikes from

two to three inches long; spikelets crowded and lapping over each other. It is common on the coast.

Sand Grass, (*tricuspis purpurea,*) is also found on dry, sandy soils, along the coast; flowering in August and September. It is acid to the taste, grows from six inches to a foot high, and has numerous bearded joints.

Orchard Grass, Rough Cocksfoot, (*dactylis glomerata.*) The generic characters are, spikelets several flowered, crowded in clusters, one-sided, panicle dense at the top, branching,

Fig. 22.

Fig. 21. Orchard Grass.

glumes two, herbaceous, keeled, long-pointed. Stamens three, seed oblong, acute, free. Named from *dactylus*, a finger.

Orchard grass flowers in dense tufts. Its stem is erect, about three feet high. I have found specimens in good soil, over five feet high. Leaves linear, flat, dark green, rough on both surfaces, which, with the fancied resemblance of its loose tufts to the foot of a barnyard fowl, have given it the common name in England of rough cocksfoot. Root perennial. Flowers in June and July. Not uncommon in fields and pastures. It is seen in Fig. 21. A magnified spikelet is shown in Fig. 22.

This is one of the most valuable and widely known of all the pasture grasses. It is common to every country in Europe, to the north of Africa, and to Asia as well as to America. Its culture was introduced into England from Virginia, where it had been cultivated some years previously, in 1764. It forms one of the most common grasses of English natural pastures, on rich, deep, moist soils. It became, soon after its introduction into England, an object of special agricultural interest among cattle feeders, having been found to be exceedingly palatable to stock of all kinds. Its rapidity of growth, the luxuriance of its aftermath and its power of enduring the cropping of cattle, commend it highly to the farmer's care, especially as a pasture grass. As it blossoms earlier than Timothy, and about the time of red clover, it makes an admirable mixture with that plant, to cut in the blossom and cure for hay. As a pasture grass it should be fed close, both to prevent its forming thick tufts and to prevent its running to seed, when it loses a large proportion of its nutritive matter, and becomes hard and wiry. All kinds of stock eat it greedily when green.

Judge Buel, distinguished as a man of taste, said of this grass: "I should prefer it to almost every other grass, and cows are very fond of it." Elsewhere he says: "The American Cocksfoot, or Orchard Grass, is one of the most abiding grasses we have. It is probably better adapted than any other grass to sow with clover and other seeds for permanent pasture or for hay, as it is fit to cut with clover and grows remarkably quick when cropped by cattle. Five or six days' growth in summer suffices to give a good bite. Its good properties consist in its early and rapid growth and its resistance of drouth; but all agree that it should be closely cropped. Sheep will pass over

every other grass to feed upon it. If suffered to grow long without being cropped, it becomes coarse and harsh. Colonel Powell, (a late eminent farmer of Pennsylvania,) after growing it ten years, declares that it produces more pasturage than any other grass he has seen in America. On being fed very close, it has produced good pasture after remaining five days at rest. It is suited to all arable soils. Two bushels of seed are requisite for an acre when sown alone, or half this quantity when sown with clover. The seed is very light, weighing not more than twelve or fourteen pounds to the bushel. It should be cut early for hay."

Mr. Sanders, a well known practical farmer and cattle breeder, of Kentucky, says of it: "My observation and experience have induced me to rely mainly on orchard grass and red clover; indeed, I now sow no other sort of grass seed. These grasses mixed, make the best hay of all the grasses for this climate (Kentucky;) it is nutritious, and well adapted as food for stock. Orchard grass is ready for grazing in the spring ten or twelve days sooner than any other that affords a full bite. When grazed down and the stock turned off, it will be ready for re-grazing in less than half the time required for Kentucky blue grass. It stands a severe drought better than any other grass, keeping green and growing when other sorts are dried up; in summer it will grow more in a day than blue grass will in a week. Orchard grass is naturally disposed to form and grow in tussocks. The best preventive is a good preparation of the ground, and a sufficiency of seed uniformly sown. The late Judge Peters of Pennsylvania,—who was at the head of agricultural improvement in that State for many years,—preferred it to all other grasses."

Orchard grass is less exhausting to the soil than rye grass or Timothy. It will endure considerable shade. In a porous subsoil its fibrous roots extend to a great depth. Its habit of growth unfits it for a lawn grass. Its seed weighs twelve pounds to the bushel, and to sow alone, about twenty-four pounds to the acre are required to make sure of a good crop. It should not be sown alone except for the sake of raising the seed. It is worthy of a much more extended cultivation among us.

Pennsylvanian Eatonia, (*Eatonia Pennsylvanica,*) is a grass

common in moist woods. It has a loose panicle, grows two feet high, with short, flat leaves, of a pale green. Flowers in June.

Rattlesnake Grass, (*glyceria canadensis.*) The generic characteristics of glyceria are, many flowered spikes, mostly flatish; glumes two pointed, nearly equal, awnless, the lower one obtuse, seven nerved; roots creeping—perennial. Wet places and standing water. The name of the genus is from a Greek word signifying sweet.

Rattlesnake grass has an oblong, pyramidal, spreading panicle, with beautifully drooping spikelets, six or eight flowered, and long, roughish leaves, which together make it an object of interest and search for boquets and vases. It is very common in wet, boggy places, growing from two to three feet high, but possesses little or no agricultural value. Flowers in July.

The Obtuse Spear Grass, (*glyceria obtusa,*) has a dense, narrowly oblong panicle; spikelets six or seven flowered, erect, swelling; lower palea obtuse, leaves smooth, as long as the stem. This is an aquatic grass, found occasionally on the borders of ponds. Flowers in August. Of no agricultural value.

Long Panicled Manna Grass, (*glyceria elongata,*) is a very distinct species; stems one to three feet high, panicle branching, narrowly elongated, recurving, the branches appressed, spikelets pale, erect, three to four flowered, lower palea obtuse, rather longer than the upper; stamens two, stigmas compound, leaves very long and rough. Flourishes in wet woods and swamps. Flowers in June and July—perennial. Of no special agricultural value.

Meadow Spear Grass, Nerved Manna Grass, (*poa nervata,*) is the fowl meadow of some farmers, while the grass most commonly called fowl meadow, (*poa serotina,*) goes with them under the name of bastard fowl meadow. It has a broad, open panicle, six inches in length, with slender branches; spikelets small, ovate, oblong, green; leaves in two rows like a fan, a little rough; stem a little compressed, one to three feet high. It is a native American grass, flowering late in June. The nutritive value of this grass, according to Sinclair, is equal at the time of flowering and when the seed is ripe, while the nutritive matter of the lattermath is said to be greater than that of most other grasses. It is a hardy grass, grows best on wet or

Fig. 23. MEADOW SPEAR GRASS.

moist grounds, and is said also to succeed on light upland soils. It is somewhat coarse, and not particularly relished by cattle, though readily eaten in winter. It would be a valuable ingredient in a mixture for moist pastures. It is not very common. It is seen in Fig. 23, while in Fig. 23 (1) is seen a magnified spikelet, and the calyx in (2.) Native of North America.

The Pale Manna Grass, (*glyceria pallida*,) grows mostly in shallow water, and is very common. Panicle erect with hairy branches, spreading, rough; spikelets few, linear, oblong, five to nine flowered; lower palea oblong, minutely *five toothed;* leaves short, sharp pointed and pale green. Flowers in July. Culms one to three feet long, creeping at the base.

One or two other species are referred to this genus, glyceria, as the Reflexed Meadow Grass, (*glyceria distans*,) found in salt marshes, along the coast, and closely allied to the Sea Spear Grass, (*poa maritima*,) and the Acute Fescue Grass, (*glyceria acutiflora*,) rarely found in low, wet places. Of no value in agriculture.

Spike Grass, (*brizopyrum spicatum*,) is a salt marsh grass, with culms or stems in tufts from creeping root-stalks, from ten to eighteen inches high. Flowers in August.

Green Meadow Grass, June Grass, Common Spear Grass, Kentucky Blue Grass, &c., (*poa pratensis.*) The characteristics of the genus poa, are, ovate spikelets, compressed, flowers two to ten in an open panicle, glumes shorter than the flowers, lower palea compressed, keeled, pointless, five nerved, stamens two or three, seed oblong, free, stems tufted, leaves smooth, flat and soft.

Specific characters: Lower florets connected at the base by a web of long, silky filaments, holding the calyx; outer palea, five ribbed, marginal ribs hairy, upper sheath longer than its leaf; height from ten to fifteen inches, root perennial, *creeping*, stem erect, smooth and round, leaves linear, flat, acute, roughish on the edges and inner surface; panicle diffuse, spreading, erect. The plant is of a light green color, the spikelets frequently variegated with brownish purple. Introduced. Flowers in June. Fig. 24 represents this grass, and Fig. 25, a flower magnified.

This is an early grass, very common on the soils of New England in pastures and fields, constituting a considerable por-

tion of the turf. It varies very much in size and appearance according to the soil on which it grows. In Kentucky it is universally known as Blue grass, and elsewhere frequently called Kentucky blue grass, and still more frequently, June grass. It has been called by some, without much reason, the most valuable of all the grasses in our pastures. It comes into the soil in some parts of the country when left to itself, and grows luxuriantly on soils best suited to it, and is relished by all cattle. Its creeping root is said by some to impoverish the soil. Wherever it is intended for hay it is cut at the time of flowering, as if the seed is allowed to ripen, more than a fourth part of the crop is lost. In its earliness, it is equalled by some of the other grasses, and in its nutritive constituents by several. After being cut in summer it starts up slowly. Low says: "It is inferior to the rough stalked meadow grass, and it may be questioned whether it deserves to be reckoned among the superior pasture grasses."

Fig. 25.

Fig. 24. June Grass.

It produces but one flowering stem in a year, while many of the other grasses continue to shoot up flower stalks, and run to seed through the season. On this account it is recommended highly for lawns, where uniformity is desired. The produce ordinarily is small, compared with other grasses, but the herb-

age is fine. It grows well in rather a dry soil, but will grow on a variety of soils, from the dryest knolls to a wet meadow. It does not withstand our severe droughts as well as some other grasses. Its reputation is far higher in this, than in its native country, where it is denied by most farmers even a place among the grasses to be recommended for cultivation. It endures the frosts of winter better, perhaps, than most other grasses; and in Kentucky, where it attains the highest perfection as a pasture grass, it sometimes continues luxuriant through their mild winters. It requires at least two or three years to become well set, and it does not arrive at its perfection as a pasture grass till the sward is older than that, and hence it is not suited to alternate husbandry, or where the land is to remain in grass only two or three years and then be ploughed up. In Kentucky, the best blue grass is found in partially shaded pastures. A well known farmer of that State, in a communication to the Ohio Farmer, says: "In our climate, and soil, it is not only the most beautiful of grasses, but the most valuable of crops. It is the first deciduous plant which puts forth its leaves here; ripens its seed about the tenth of June, and then remains green, if the summer is favorable in moisture, during the summer months, growing slowly till about the last of August, when it takes a second vigorous growth until the ground is frozen by winter's cold. If the summer is dry, it dries up utterly, and will burn if set on fire; but even then, if the spring growth has been left upon the ground, is very nutritious to all grazing stock, and especially to sheep and cattle, and all ruminating animals. When left to have all its fall growth, it makes fine winter pasture for all kinds of grazing animals. Cattle will not seek it through the snow, but sheep, mules and horses will paw off the snow and get plenty without any other food. When covered with snow, cattle require some other feeding; otherwise they do well all winter upon it.

"It makes also the best of hay. I have used it for that for twenty years. It should be cut just as the seeds *begin* to ripen, well spread, and protected from the dew at night by windrowing or cocking; the second evening stacked, with salt, or sheltered, with salt also. When properly cured, stock seem greatly to prefer it to all other hay. I would not recommend it for meadow, especially, however, because the yield is hardly equal

to Timothy and clover, and because it is more difficult to cut and cure."

The same writer says: "Any time in the winter, when the snow is on the ground, sow broadcast from three to four quarts of clean seed to the acre. With the spring the seeds germinate and are very fine in the sprouts, and delicate. No stock should be allowed for the first year, nor until the grass seeds in June, for the first time in the second year. The best plan is to turn on your stock when the seed ripens in June. Graze off the grass, then allow the fall growth and graze all winter, taking care never to feed the grass closely at any time."

Another eminent cattle breeder speaking of this grass, says: "Perennial grasses are the true basis of agriculture, in the highest condition of that best employment for man. Grasses which are not perennial, are of immense value, especially as one of the shifts in the ordinary rotation of crops, suited to the agriculture of the great upper, or northerly portion of our continent, all of it above the *cotton* line. But it is the grasses which are perpetual, that I chiefly allude to, and among these, emphatically the blue grass, as it is called in the regions where it flourishes most. Whoever has limestone land, has blue grass; whoever has blue grass, has the basis of all agricultural prosperity; and that man, if he have not the finest horses, cattle and sheep, has no one to blame but himself. Others, in other circumstances, may do well; he can hardly avoid doing well, if he will try."

By reference to a table on a subsequent page, containing the results of the recent investigations of Prof. Way, the distinguished chemist of the Royal Agricultural Society of England, it will be seen how inferior this grass is when green, to Timothy, for instance, in all the nutritive, flesh-forming, and especially in the fat-forming principles which contribute so largely to the development and support of the whole animal system. The reader is referred to that table, and to another following it, containing analyses of these plants when dried and freed from water, and to the explanatory remarks on the nutritive principles of plants, which precede those tables.

Blue Grass, or Wire Grass, (*poa compressa.*) Stems ascending, flattened, the uppermost joint near the middle, leaves short, bluish green, panicle dense and contracted, ex-

panding more at flowering; short branches often in pairs, covered with four to nine flowered, flat spikelets; flowers rather obtuse, linear, hairy below on the keel; ligule short and blunt; height about a foot. It is very common on dry, sandy, thin soils and banks, so hardy as to grow on the thin, hard soils covering the surface of rocks, along trodden walks, or gravelly knolls. It shoots its leaves early, but the amount of its foliage is not large, otherwise it would be one of our most valuable grasses, since it possesses a large per cent. of nutritive matter. Flowers in July. Most grazing animals eat it greedily, and it is especially relished by sheep. Its bluish green stems retain their color after the seed is ripe. It shrinks less in drying than most other grasses, and consequently makes a hay very heavy in proportion to its bulk. It is an exceedingly valuable pasture grass on dry, rocky knolls and should form a portion of a mixture for such soils. This should not be confounded with Kentucky blue grass alluded to above.

Annual Spear Grass, (*poa annua*, see Fig. 1,) is, perhaps, the most common of all our grasses. Its stems are spreading, flattened, panicle often one sided, spikelets crowded, three to seven flowered, lower palea more or less hairy on the nerves below; leaves of a light green, sword-shaped, flat, often *crumpled at the margins*, as appears in Fig. 1, smooth on both surfaces, rough at the edges. *Florets not webbed*, and this distinguishes it from the June grass, (*poa pratensis*,) and its varieties. The outer or lower palea of this grass has no hairs on the lateral ribs as the *poa pratensis* has. This modest and beautiful grass flowers throughout the whole summer and forms a very large part of the sward of New England pastures, producing an early and sweet feed, exceedingly relished by cattle. It does not resist the drought very well, but becomes parched up in our pastures.

The Rough Stalked Meadow Grass, (*poa trivialis*,) though not so common as the June grass, (*poa pratensis*,) is still often met with, and is found to have webbed florets; outer palea five ribbed, marginal ribs not hairy, ligule long and pointed, stems two to three feet high. Distinguished from June grass by having rough sheaths, while in the latter the sheaths are smooth, the ligule obtuse and the marginal ribs of outer palea furnished with hairs. The rough stalked meadow grass has a fibrous

root, that of the June grass is creeping. It flourishes in moist meadows where it flowers in July. Introduced. This grass is seen in Fig. 26, while Fig. 27 represents a flower somewhat magnified.

This is a valuable grass to cultivate in moist, sheltered soils, possessing very considerable nutritive qualities, coming to perfection at a desirable time, and being exceedingly relished by cattle, horses and sheep. For such soils it should form a portion of a mixture of seeds, producing, in mixture with other grasses which serve to shelter it, a large yield of hay, far above the average of grass usually grown on a similar soil. It should be cut when in seed and not in the flower. Seven pounds of seed to the acre will produce a good sward. The grass loses about seventy per cent. of its weight in drying. Its hay contains about one and sixty hundredths per cent. of azote, and the nutritive qualities of the lattermath exceed very considerably those of the crop cut in the flower or in the seed.

Fig. 26. Rough Stalk Meadow Grass.

Fig. 27.

Wood Meadow Grass, (*poa nemoralis*,) is met with in Hampshire and Berkshire counties. It grows from eighteen inches to two feet high, has a perennial, creeping root, an erect stem,

slender, smooth, the upper sheath no longer than its leaf, with a very short ligule, the base of the floret having a silky web suspending the calyx, leaves, light green. It is common in moist, shady places, and appears as a tall, rank grass, with a long, finely arched panicle. It flowers in June and ripens its seed in July.

Fig. 28. Wood Meadow Grass.

Fig. 29.

Though it has never to my knowledge been cultivated in this country, it appears to me worthy of attention for moist soils. It is certainly to be classed among the best of shaded pasture grasses, furnishing a fine, succulent and very nutritive herbage, which stock of all kinds are very fond of. Hay contains one and sixty-four one-hundredths per cent. of azote. The grass loses about fifty-five per cent. of its weight in drying. Fig. 28 represents this grass in blossom; Fig. 29 a magnified flower.

The Creeping Sea Meadow Grass, or Sea Spear Grass, (*poa maritima,*) referred by Gray to *glyceria*, is a beautiful grass which appears in and around salt marshes, growing from six to twelve inches high, and having a perennial, *creeping* root. Stem erect, round, smooth, leaves mostly folded and compressed, roughish on the inner surface, spikelets linear, with from six to ten florets *not* webbed, the outer palea o lower floret terminating in an acute point. Flowers in July. Grows naturally near the sea. It is seen in Fig. 30, and its flower magnified, in Fig 31.

Fig. 30. Sea Spear Grass.

Fig. 31.

Fig. 33.

Fig. 32. Common Manna Grass.

The Floating Meadow Grass, or Common Manna Grass, (*poa fluitans*,) referred by Gray to *glyceria*, differs from the other species of the poa genus in the general appearance of its slender panicle and long, linear spikelets. It grows from fifteen inches to two feet high, with a perennial, creeping root, erect, round, smooth stem, leaves large, rather long, roughish on both sides, lower ones flat, upper ones generally folded; spikelets few, long and linear, as shown in Fig. 32, which represents the

plant near the time of flowering. Fig. 33 shows a magnified spikelet of this grass, florets not webbed. Flowers late in June.

This grass grows naturally in very moist and muddy places, in ditches, on the margins of ponds and streams, and is very common. It is capable of cultivation as a permanent pasture grass, and its yield compares well with many of the other grasses. Its seeds are greedily sought by birds, and in some parts of Germany are said to be used as a delicacy in soups and gruels.

Fig. 34. Water Spear Grass.

The Wavy Meadow Grass, (*poa laxa*,) occurs rarely on high and rocky hills, but is not sufficiently common or valuable to need description.

The Water Spear Grass, or Reed Meadow Grass, (*poa aquatica*,) grows in wet soils, in Hampshire County; is a tall, reedy grass, four or five feet high with a panicle nearly a foot long, diffuse, with smooth, flexuous branches. From its large size and broad leaves it can hardly be mistaken for any of the other species of poa. Its root is perennial, creeping, stem erect, stout, smooth, joints seven, smooth, spikelets numerous, florets not webbed. Flowers in August. Seen in Fig. 34, and its spikelet in Fig. 35. This grass is referred

Fig. 35.

by Gray and others, to *glyceria*. It is very common in wet meadows and will be easily recognized. More nutritive when in flower than when the seed is ripe. It contains a comparatively large per cent. of sugar. Makes a valuable fodder and cattle are very fond of it.

Several other species belonging to this genus, are frequently met with, as the Branching Spear Grass, on dry sandy soils, a very elegant species, with a large panicle of sea-green spikelets; the Hair Spear Grass, also an elegant grass growing on similar soils, with a hairy branching panicle over a foot long, leaves linear, nerved. But perhaps the most important of all is the Fowl Meadow, or False Redtop, (*poa serotina.*) [See Frontispiece.]

The specific characteristics of this species are two to four, sometimes five, flowered spikelets, oval, spear shaped, ligules elongated, flowers acutish, green, often tinged with purple, roots slightly creeping; wet meadows and banks of streams, very common. Flowers in July and August. In long continued moist weather the lower joints send up flowering stems. The panicle is erect and spreading when in flower, but more contracted and drooping when ripe. It is perennial. Native of Germany.

It early commended itself to the attention of farmers, for Jared Eliot, writing in 1749, says of it: "There are two sorts of grass which are natives of the country, which I would recommend,—these are Herds-grass, (known in Pennsylvania by the name of Timothy-grass,) the other is Fowl Meadow, sometimes called Duck-grass, and sometimes *Swamp-wire Grass*. It is said that Herds-grass was first found in a swamp in Piscataqua, by one Herd, who propagated the same; that Fowl Meadow-grass was brought into a poor piece of meadow in Dedham, by ducks and other wild water-fowl, and therefore called by such an odd name. It is supposed to be brought into the meadows at Hartford by the annual floods, and called there Swamp-wire grass. Of these two sorts of natural grass, the fowl-grass is much the best; it grows tall and thick, makes a more soft and pliable hay than Herds-grass, and consequently will be more fit for pressing, in order to ship off with our horses; besides it is a good grass, not in abundance inferior to English grass. It yields a good burden, three loads to the acre. It must be sowed in low, moist land. This grass has another good quality, which

renders it very valuable in a country where help is so much wanting; it will not spoil or suffer, although it stand beyond the common times for mowing. Clover will be lost, in a great measure, if it be not cut in the proper season. Spear-grass, commonly called English grass, if it stands too long, will be little better than rye straw; if this outstand the time, it is best to let it stand till there comes up a second growth, and then it will do tolerably well; but this fowl-grass may be mowed any time from July to October. * * * This I wondered at, but viewing some of it attentively, I think I have found the reason of it. When it is grown about three foot high it then falls down, but doth not rot like other grass when lodged; in a little time after it is thus fallen down, at every joint it puts forth a new branch; now to maintain this young brood of suckers there must be a plentiful course of sap conveyed up through the main stem or straw; by this means the grass is kept green and fit for mowing all this long period."

This grass grows abundantly in almost every part of New England, especially where it has been introduced and cultivated in suitable ground, such as the borders of rivers and intervals occasionally overflowed. It will not endure to be long covered with water, especially in warm weather. It is well to let a piece go to seed, save the seed and scatter it over low lands. It makes an excellent grass for oxen, cows and sheep, but is thought to be rather fine for horses. It never grows so coarse or hard but that the stalk is sweet and tender and eaten without waste. It is very easily made into hay, and is more nutritive, according to Sinclair, than either foxtail, orchard grass, or tall meadow oat grass. Owing to its constantly sending forth flowering stems, the grass of the lattermath contains more nutritive matter than the first crop at the time of flowering, hence the names *fertilis* and *serotina*, fertile and late flowering meadow grass. It thrives best when mixed with other grasses, and deserves a place in all mixtures for rich moist pastures.

The Creeping Meadow Grass, (*eragrostis reptans*,) is frequently found on the sandy banks of rivers, and is a beautiful and delicate grass. Flowering in July and August. Its leaves are short, nearly awl-shaped, spikelets smooth, long and lance shaped, flowers acute, sheaths loose, striate and a little hairy on

the margin, panicles from one to two inches long. Not a cultivated grass.

The Strong-scented Meadow Grass, (*eragrostis poæoides*,) is sometimes found in sandy fields, roadsides, cultivated grounds and waste places. Its leaves are flat and smooth, lower sheaths hairy, spikelets containing from ten to twenty florets of a lead color. It flowers in August and September. Of no importance in agriculture.

A variety of this grass (the *megastachya*) is found more frequently on similar situations; flowering about the same time; emitting, when fresh, a sharp and disagreeable odor, by which it may be known.

The Slender Meadow Grass, (*eragrostis pilosa*,) the Hair-panicled Meadow Grass, (*eragrostis capillaris*,) the Hairy Meadow Grass, (*eragrostis pectinacea*,) are found in this State, but they are of no special importance for cultivation. They all occur on sandy, dry, waste places, the last only near the coast, and all flower in August and September.

Quaking Grass, (*briza media*,) is sometimes met with in the eastern part of the State, as in the pastures of Dorchester. Panicle erect, with very slender spreading branches, and large, purplish, tremulous spikelets from five to nine flowered, inner glume finely fringed, entire at the end. (Fig. 36.) In Fig. 37 is shown a magnified spikelet. It is a very beautiful, light, slender grass, about a foot high, perennial. Flowering in June and July. There is an annual, the Large Quaking Grass, (*briza maxima*,) with large many-flowered spikes, cultivated in gardens for ornament.

Small Fescue Grass, (*festuca tenella*.) The generic characters of this genus are oblong spikelets, somewhat compressed, from three to many flowered, two very unequal glumes, pointed, paleæ roundish on the back, from three to five nerved, awn pointed or bristle shaped, stamens three, flowers harsh, often purplish, panicle nearly erect, leaves narrow, rigid, of a grayish green.

The small fescue has a spike-like panicle, somewhat one-sided, from seven to nine flowered, awn of the awl-shaped palea, slender, leaves bristle-formed, stem slender, six to twelve inches high. It flourishes on dry and sterile soils, and is common. Flowers in July.

Fig. 36. Quaking Grass.

Sheep's Fescue, (*festuca ovina*,) is known by its narrow panicle, short, tufted, bristle-shaped leaves, of a grayish color, somewhat tinged with red, its two to six flowered spikelets, awn, often nearly wanting. It grows from six to ten inches high in dense perennial rooted tufts. It forms an excellent pasturage for sheep. It flowers in June and July, in dry pastures. In Fig. 38 is seen the form of this grass, and in Fig. 39 is shown a magnified spikelet of it.

Fig. 37.

Meadow Fescue, (*festuca pratensis*,) is one of the most common of the fescue grasses. It is said to be the Randall grass of Virginia. Its panicle is nearly erect, branched, close, somewhat inclined to one side; spikelets linear, with from five to ten cylindrical flowers; leaves linear, of a glossy green, pointed, striated, rough on the edges; stems round, smooth, from two to three feet high, roots, creeping, perennial. Its radical or root leaves are broader than those of the stem, while in most other species of fescue the radical leaf is generally narrower than those of the stem. Flowers in June and July, in moist pastures and near farm houses.

Fig. 38. Sheep's Fescue.

Fig. 39

Fig. 41.

Fig. 40. Meadow Fescue.

This is an excellent pasture grass, forming a very considerable portion of the turf of old pastures and fields, and is more extensively propagated and diffused by the fact that it ripens its seed before most other grasses are cut, and sheds them to spring up and cover the ground. Its long and tender leaves are much relished by cattle. It is never or rarely sown in this country, notwithstanding its great and acknowledged value as a

pasture grass. If sown at all, it should be in mixture with other grasses, as orchard grass, rye grass, or common spear grass. It is of much greater value at the time of flowering than when

Fig. 42. Tall Fescue Grass.

Fig. 43.

Fig. 45.

Fig. 44. Red Fescue.

the seed is ripe. It is said to lose a little over fifty per cent. of its weight in drying for hay. It is shown in Fig. 40, and its magnified spikelet in Fig. 41.

The TALL FESCUE GRASS, (*festuca elatior*,) is also found pretty

commonly in moist meadows and around farm houses. Its panicle is contracted, erect, or somewhat drooping, with short branches, spreading in all directions; spikelets crowded, with five to ten flowers, rather remote, oblong, lanceolate; leaves flatish, linear, acute; stems two to four feet high, root perennial, fibrous, somewhat creeping and forming large tufts. Fig. 42 shows this plant at the time of flowering, and Fig. 43 a magnified spikelet of the same. Flowers in June and July.

It is a nutritive and productive grass, growing naturally in shady woods and moist, stiff soils. Cattle are very fond of it. Said by some to be identical with the meadow fescue.

The Hard Fescue Grass, (*festuca duriuscula*,) is also found to some extent, though not so commonly as the meadow fescue. It is by some regarded as a variety of the sheep's fescue, taller and with a panicle more open, leaves flat, and spikelets four to eight flowered. It grows from one to two feet high. Flowers in June, in pastures and waste grounds.

The Red Fescue, (*festuca rubra*,) by some regarded as only a variety of the preceding, is one of the largest of the varieties of fescue. Its leaves are broadish, flat, root extensively creeping, and throwing out lateral shoots. Found in dry pastures near the sea shore, in sandy soils. It is a grass of better quality than some of the other varieties, but never cultivated here as an agricultural product. The color of its leaves is somewhat more grayish than the preceding and often tinged with red. It is shown in Fig. 44, while its spikelet is seen magnified in Fig. 45.

The Slender Spiked Fescue, (*festuca loliacea*,) is a species nearly allied to the tall fescue and possesses much the same qualities. It grows naturally in moist, rich meadows, forming a good permanent pasture grass, but as it is met with only very rarely, if ever, among American grasses, and is of no value for cultivation, it scarcely deserves a more extended notice. Fig. 46, a specimen of this plant in blossom. Fig. 47, a magnified flower of it.

The Nodding Fescue, (*festuca nutans*,) is also rarely met with in rocky woods, and needs only to be mentioned.

Crested Dog's Tail, (*cynosurus cristatus*.) (Fig. 48.) This grass is rarely found here, and scarcely needs description. Its spikes are simple, linear, spikelets awnless, stems one foot

Fig. 46. Slender Fescue.

Fig. 47

Fig. 48. Crested Dog's Tail.

high, stiff, smooth, root perennial, fibrous and tufted. Flowers in July. It is said by some to be a valuable agricultural grass, but cattle seldom eat it, on account of its wiry stems; but on dry, hard soils and hills pastured with sheep, it is of value as a hardy, permanent grass. It is used in the manufacture of straw plait. Fig. 49 represents a magnified spikelet of the crested dog's tail.

Willard's Bromus, Chess, Cheat, (*bromus secalinus.*) The

characteristics of this genus (*bromus*) are, spikelets from five to many flowered, panicled, glumes not quite equal, shorter than the flowers, mostly keeled,—the lower, one to five, the upper, three to nine nerved,—paleæ herbaceous, lower one convex on the back, or compressed, keeled, five to nine nerved, awned or bristle pointed from below the tip, upper palea at length adhering to the groove of the oblong grain, fringed on the keel, stamens three, styles attached below the apex of the ovary. The grasses of this genus are coarse, with large spikelets, somewhat drooping generally when ripe.

The specific characteristics are, a spreading panicle slightly drooping, spikelets ovate, smooth, of a yellowish green tinge, showing the rachis when in seed, and holding from six to ten rather distinct flowers. In the spikelet exhibited in the cut, (Fig. 50,) seven can be distinctly counted, the eighth or ninth imperfectly developed can often be found; stems erect, smooth, round, from two to three feet high, bearing four or five leaves with striated sheaths; the upper sheath crowned with an obtuse, ragged ligule, the lower sheaths soft and hairy, the hairs pointing downwards; joints five, slightly hairy, leaves flat, soft, linear, more downy on the upper than on the under side, points and margin rough to the touch. *Summit of the large glume midway between its base and the summit of the second floret*, a constant mark of distinction from *bromus racemosus* and *bromus mollis*. (Fig. 50,) (b.) Fig. 51 shows the form of the spikelet a few days before coming to maturity. Flowers in June and July. It has no relation to Italian rye grass.

Fig. 49.

Fig. 50.

Fig. 51.

Distinguished from *bromus arvensis* in the spikelets having fewer florets, and the outer palea being rounded at the summit.

Nothing more clearly illustrates the want of accurate knowledge of subjects intimately connected with agriculture, and immediately affecting the farmers' interests, than the history of

the introduction and propagation of this worthless pest to our grain fields. It has been heralded in the papers, in connection with the names of distinguished friends of agriculture, with the earnest hope that it might receive extended trials. Monstrous prices have been charged and paid by the unsuspecting farmer for its seed, in many cases four and five dollars a bushel, a pledge being exacted that it should not be allowed to go to seed, for a reason, probably, which will shortly appear. Committees of agricultural societies have been invited to examine and report upon it; and in a letter now lying before me, the disinterested propagator very kindly offers to put up ten barrels of bromus seed for $100, saying, that "of course the earliest applicants will be sure of obtaining till all is gone, which would scarcely give a barrel to a State. * * Years must elapse before the country can be supplied as it now is with Herds-grass and clover seed. My offer invites co-operation and participation in the profits and pleasures now available"—for taking advantage of the honest credulity of the public?

A quantity of bromus seed was sent to the State Farm for the purpose of experiment, with a letter with directions to sow with clover in the spring of 1855. The crop was cut while yet green, and before the grass had developed sufficiently to distinguish it with certainty. This present year (1856) directions were given to let it stand later in the season. While engaged in the collection and study of specimens in the course of the summer, I gathered samples of this grass when it was still immature, the spikelets having very much the appearance indicated in Fig. 51. Without giving it a very close examination at the time, I pronounced it the *bromus arvensis*, which at that stage of its growth it very much resembles. A few days after, I was astonished to see it develop into Chess (*bromus secalinus.*) This was the first ripe specimen of Willard's bromus I had seen. I examined it with care with a strong magnifying glass, and to avoid the possibility of mistake, I submitted specimens of it to Prof. Gray, of Cambridge, and to Prof. Dewey, of Rochester, New York, both of whom, after examination, pronounced genuine chess.

But Mr. Willard having quoted from the report of a committee of an agricultural society in which it was said that if a "jury of cows should confirm the opinion of Mr. Willard as to the

superiority of the grass, then will the agricultural community owe him a debt of gratitude for having introduced to notice here a species of grass which is highly beneficial on light sandy soils, much superior to any other species, and producing most abundantly on land of better quality," I very recently directed this grass to be submitted to such a jury, empanelled and kept under the charge of Mr. L. P. Chamberlain at the State Farm, which unhesitatingly pronounced a verdict in accordance with the facts, which were as follows:—

The grass which was first submitted for comparison with the bromus was the Reed Canary grass, (*phalaris arundinacea*,) a grass of very slight nutritive and palatable qualities, as will appear by reference on a subsequent page to the careful analysis made of it at my request by Prof. E. N. Horsford, of the Lawrence Scientific School, Cambridge. The English hay used was such as commonly goes by that name among farmers, made up of Timothy and Redtop mainly, of fair quality. The meadow or swale hay was taken from a wet meadow, made up of coarse swale grasses, such as are common in eastern Massachusetts, and pass under the term of "meadow hay." The bromus was carefully picked out from all other grasses. The two kinds given in each trial were put into the same crib, but separated by a partition.

First trial—Bromus and reed canary grass. There was no choice. Both were eaten alike till they were gone.

Second—Bromus and English hay; preferred English hay.
Third—Bromus and swale hay; " swale.
Fourth—Bromus and oat straw; " bromus.
Fifth—Canary grass and English hay; " English hay.
Sixth—Canary grass and swale; " swale at once.
Seventh—Canary grass and oat straw; " oat straw.
Eighth—Canary grass and cornstalks; " cornstalks.

Ninth—Bromus and cornstalks. Ate nearly alike of each till both were gone.

Tenth—Bromus and millet. Chose the millet and did not touch the bromus.

This is a true transcript of the verdict of that intelligent jury, and it is precisely what I should have anticipated from what I knew of the grasses. The trial by jury should be final.

It is unnecessary to say that "Cheat" is a troublesome weed

to the farmer, especially when it appears in his grain fields. It is an early grass, but the quantity of herbage, and especially its quality, make it unfit for cultivation. Indeed, the only species of any value, or at all fit for cultivation, belonging to this large genus of grasses, is the *bromus arvensis*, and even that has been discarded from modern agriculture.

I have been thus minute in speaking of this grass, because I have felt it my duty to disabuse the minds of farmers with regard to it, a duty in which I have recently, and since the above was written, been anticipated by my friend, Sanford Howard, Esq., author of a valuable paper on the Grasses, in the Transactions of the New York State Agricultural Society, for 1855.

I have but little acquaintance with, and no prejudice against, Mr. Willard, but regret exceedingly that he or any one else should make a mistake so serious to the community, and take so much pains to propagate "cheat." Fortunately the plant is annual. The fact of its having been cut before it was ripe, in 1855, accounts for its growing on the same piece in 1856.

Smooth Brome Grass, or Upright Chess, (*bromus racemosus*,) has a panicle erect, simple, rather narrow, contracted when in fruit. Flowers closer than in the preceding, lower palea exceeding the upper, bearing an awn of its own length. Stem erect, round, more slender than in chess, sheaths slightly hairy. In other respects it is very much like Willard's bromus, but may always be distinguished from it as well as from *bromus arvensis*, in the summit of the large glume being half-way between its base and the summit of the *third* floret, on the same side; whereas in Willard's bromus the summit of the large glume is half-way between its base and summit of the *second* floret. This character is constant, and offers the surest mark of distinction. It is common in grain fields. Flowers in June. It is worthless for cultivation.

Soft Chess, or Soft Brome Grass, (*bromus mollis*,) is sometimes found. I procured beautiful specimens of it at Nantucket, where it was growing in the turf with other grasses on a sandy soil near the shore. Its panicle is erect, closely contracted in fruit, spikelets conical, ovate, stems erect, more or less hairy, with the hairs pointing downwards from twelve to eighteen inches high, joints four or five, slightly hairy, leaves flat, striated, hairy on both sides, rough at the edges and points; sum-

mit of the large glume midway between its base and the apex of the third floret, by which it is always distinguished from Willard's bromus. Flowers in June. Birds are fond of the seed, which are large and ripen early. Of no value for cultivation.

The Wild Chess, (*bromus kalmii*,) is another species, found often in dry, open wood-lands. It has a small, simple panicle, with the spikelets drooping on hairy peduncles, seven to twelve flowered and silky; awn only one-third the length of the lance-shaped flower, stem slender, eighteen inches to three feet high, leaves and sheaths hairy. Flowers in June and July. Of no value for cultivation.

Fringed Brome Grass, (*bromus ciliatus*,) is often found in woods and on rocky hills and river banks. It has a compound panicle, very loose, nodding, spikelets seven to twelve flowered, flowers tipped with an awn half to three-fourths their length, stem three to four feet high, with large leaves. Flowers in July and August. Of no value for cultivation.

The Meadow Brome Grass, (*bromus pratensis*,) is a perennial weed in the corn fields of England, and is only recommended in any part of Europe for dry, arid soils, where nothing better will grow. Fig. 52 represents this grass, and Fig. 53 a magnified spikelet.

Not one of the brome grasses is worthy of a moment's attention as a cultivated agricultural grass, and the cleaner the farmer keeps his fields of them the better.

The Common Reed Grass, (*phragmites communis*,) is a very tall, broad-leaved grass, with the flower in a large terminal panicle. It looks at a little distance very much like broomcorn; stem five to twelve feet high. It grows on the borders of ponds and swamps. It is said to be the largest grass in the United States. It occurs in several localities in Franklin County, and it is not uncommon in the eastern part of the State. Flowers in September.

Perennial Rye Grass, common Darnel, (*lolium perenne*.) Generic characters—spikelets many flowered, solitary on each joint of the continuous rachis, placed edgewise. Specific characters—stem erect, smooth, fifteen inches to two feet high, root perennial, fibrous, joints four or five, smooth, often purplish, leaves dark green, lanceolate, acute, flat, smooth on the outer surface

Fig. 52. Meadow Brome Grass.

Fig. 53.

Fig. 55.

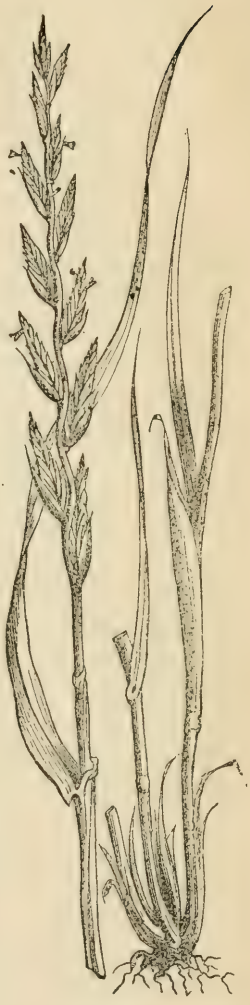


Fig. 54. Rye Grass.

and roughish on the inner, glume much shorter than the spikelet, flowers six to nine, awnless. Flowers in June. Shown in Fig. 54. Fig. 55 represents a magnified spikelet of this plant.

This grass has had the reputation in Great Britain, for many years, of being one of the most important and valuable of the cultivated grasses. It is probably much better adapted to a wet and uncertain climate, than to one subject almost annually to droughts, which often continue many weeks, parching up every

green thing. There is, perhaps, no grass, the characteristics of which vary so much from the influences of soil, climate and culture as perennial rye grass. Certain it is that this grass has been cultivated in England since 1674, and in the south of France from time immemorial. It is admitted to be inferior in nutritive value to orchard grass, (*dactylis glomerata*,) when green.

Whenever it is cut for hay, it is necessary to take it in the blossom, or very soon after, since otherwise it becomes hard and wiry, and is not relished by stock of any kind; and it changes very rapidly after blossoming, from a state in which it contains the greatest amount of water, sugar, &c., and the least amount of woody fibre—into the state in which it possesses the least amount of water, sugar, &c., and the greatest amount of woody fibre and other insoluble solid matter. A specimen analyzed about the 20th of June, and found to contain 81¼ per cent. of water and 18¾ per cent. of solid matter, was found only three weeks later to contain only 69 per cent. water, and 31 per cent. solid matter. It is undoubtedly a valuable grass, and worthy of attention; but it is not to be compared, for the purposes of New England agriculture, to Timothy or to orchard grass. It produces abundance of seed, soon arrives at maturity, is relished by stock, likes a variety of soils, all of which it exhausts; lasts six or seven years, and then dies out.

Italian Rye Grass, (*lolium italicum*,) has been recently introduced into this State, and is now undergoing experiment which will assist in determining its value for us. It differs from perennial rye grass in the florets having long, slender awns, and from bearded darnel, (*lolium temulentum*,) in the glumes being shorter than the spikelets. This difference will be manifest on reference to Fig. 56, and Fig. 57, which represents a magnified spikelet. It turfs less than the perennial rye grass, its stems are higher, its leaves are larger and of a lighter green, it gives an early, quick and successive growth till late in the fall.

To say that it is, or would be, the best grass in our climate and on our soils, would be altogether premature; but it has the credit abroad of being equally suited to all the climates of Europe, giving more abundant crops, of a better quality, and better relished by animals than the perennial rye grass. It is one of the greatest gluttons of all the grasses either cultivated

Fig. 56. Italian Rye Grass.

Fig. 57.

Fig. 59.

Fig. 58. Many-flowered Darnel.

or wild, and will endure any amount of forcing by irrigation or otherwise, while it is said to stand a drought remarkably well. The soils best adapted to it seem to be moist, fertile and tenacious, or of a medium consistency; and on such soils it is said to be one of the best grasses known to cut green for soiling, affording repeated luxuriant and nutritive crops. I have not seen enough of it to speak from personal observation or experience of the comparative profit of this grass and Timothy for cultivation here, but its comparative nutritive value is well

known from the thorough and reliable analyses of Prof. Way. By these it appears that 100 parts of Timothy grass, as taken from the field, contain 57.21 per cent. of water, 4.86 per cent. of albuminous or flesh forming principles, 1.50 per cent. of fatty matters, 22.85 per cent. of heat producing principles, such as starch, gum, sugar, &c., 11.32 per cent. of woody fibre, and 2.26 of mineral matter or ash, while 100 parts of Italian rye grass taken from the same kind of soil and in the same condition, green, contained 75.61 per cent. of water, 2.45 of albuminous or flesh forming principles, .80 of fatty matters, 14.11 of heat producing principles, starch, gum and sugar, 4.82 of woody fibre, and 2.21 of mineral matter or ash. Of these, the flesh forming principles, fatty matters, and heat producing principles, are, of course, by far the most important; and in all these our favorite Timothy very far excels the Italian rye grass, showing a nutritive value nearly double. Nor has the Italian rye grass any advantage over Timothy or Herds-grass in the dried state, though the difference is by no means so marked, the former dried at 212° Fahrenheit containing 10.10 per cent. of flesh forming principles, the latter 11.36; the former containing 3.27 per cent. of fatty matter, the latter 3.55; the former containing 57.82 per cent. of heat forming principles, the latter 53.35.

There are 432,000 seeds in a pound of Italian rye grass and from thirteen to eighteen pounds in a bushel.

The Bearded Darnel, (*Iolium temulentum*,) is sometimes found in our grain fields, with its glume equalling the five to seven flowered spikelets, and awn longer than the flower. Its grain is poisonous—almost the only instance known among the grasses.

The Many-Flowered Darnel, (*Iolium multiflorum*,) is, perhaps, the most showy species of rye grass, cultivated. It is but very rarely, if ever, met with here, though it was introduced from France to England about thirty years ago, and is cultivated to some extent. Fig. 58 shows the appearance of this grass, and Fig. 59 a magnified spikelet. It is very nearly allied, if not identical with Italian rye grass.

Couch Grass, Quitch Grass, Twitch Grass, Dog Grass, Chandler Grass, &c., (*triticum repens.*) The chief generic marks of this grass are, three or several flowered spikelets,

compressed, with the flat side towards the rachis; glumes nearly equal and opposite, nerved, lower palea like the glumes convex on the back, awned from the tip, upper flattened, stamens three; mostly annuals, but others are perennials, to which the couch grass belongs. The specific characters of couch grass are, roots creeping extensively, stem erect, round, smooth, from one to two or two and a half feet high, striated, having five or six flat leaves with smooth, striated sheaths; the joints are smooth, the two uppermost very remote, leaves dark green, acute, upper one broader than the lower ones, roughish, sometimes hairy on the inner surface, smooth on the lower half. Inflorescence in spikes. Flowers in June and July. Introduced from Europe. (Figs. 60 and 61.)

Fig. 60. Couch, or Twitch Grass.

Fig. 61.

This plant is generally regarded by farmers as a troublesome weed, and efforts are made to get rid of it. Its long, creeping roots, branching in every direction, take complete possession of the soil and impoverish it. When green, however, it is very much relished by cattle, and if cut in the blossom it makes a nutritious hay. Dogs eat the leaves of this grass and those of one other species for their medicinal qualities in exciting vomiting. I have seen acres of it on the Connecticut River meadows, where it had taken possession and grew luxuriantly, and is called wheat grass, from its resemblance to wheat. It goes in different parts of the State by a great

variety of names, as Quake grass, Quack grass, Squitch grass. It is important to destroy it if possible, and the means of doing it will be alluded to on a subsequent page.

Squirrel-tail Grass, (*hordeum jubatum.*) is widely diffused over our salt marshes. Its specific characters are a slender stem, smooth, about two feet high, with rather short leaves, and low, lateral, abortive, neutral flowers on a short pedicel, short awned, the perfect flower bearing an extremely long awn about the length of the similar hairy glumes, all spreading. It is common on moist sands and marshes on the sea shore. Flowers in June..

The common two-rowed barley, (*hordeum distichum.*) belongs also to the same genus as well as the common four or six-rowed barley, (*hordeum vulgare.*)

Lyme Grass, Wild Rye, (*elymus virginicus,*) is frequent along the banks of rivers. Its generic characteristics are two to four spikelets at each joint of the rachis, all fertile, each one to seven flowered, glumes both on one side of the spikelet, paleæ two, lower one usually awned, mostly perennial, some species annual.

Specific description: Spike upright, dense and thick on a short peduncle usually included in the sheath; two or three spikelets together, two or three flowered, smooth, shortly awned, stamens three, stems stout, from two to three feet high, leaves broad and rough. Flowers in July and August. Of no special value as an agricultural grass.

Canadian Lyme Grass, (*elymus canadensis.*) Spike rather loose and curving at the extremity, spikelets mostly in pairs of three to five, long awned, rough, hairy flowers, the lance awl-shaped glumes, tipped with shorter awns, stem three to four feet high, root creeping, leaves broad, flat, linear, sheaths smooth and ligule short. Flowers in August. It is common on the banks of rivers.

Slender Hairy Lyme Grass, (*elymus striatus,*) is sometimes found in rocky woods and on the banks of streams, as the most slender and smallest flowered species of this genus. It flowers in July, and is so rare and of so little value as an agricultural grass, as not to need further description.

Upright Sea Lyme Grass, (*elymus arenarius.*) This grass, which much resembles beach grass, grows from two to five

feet high, with a perennial long creeping root, stem erect, round, smooth, leaves long, narrow, hard, greyish, pointed, grooved, rolled in, smooth behind and rough on the inner surface. It flowers in July. Differs from the common beach grass in having a short obtuse ligule, and spikelets without footstalks, of three or four florets, while beach grass has a long and pointed ligule, and spikelets with footstalks, and of only one floret.

Sinclair calls this grass the sugar cane of Great Britain. It contains a large quantity of saccharine matter, and it is probable that mixed with beach grass, as it is in Holland, it would be valuable to cut up and mix with common hay for winter feed. It is used precisely as beach grass is here, to prevent the encroachments of the sea, and to arrest the drifting of sand. It is not found growing wild in this country as beach grass is. I have cultivated it, by way of a partial experiment, on Nahant Beach, and it has been sown in other parts of the country.

Bottle-brush Grass, (*gymnostichum hystrix*,) is found rather commonly in moist rocky woodlands, and along shaded banks of streams, and may be known by its loose upright spike and spreading spikelets, smooth sheaths and leaves, smoothish flowers tipped with an awn three times their length. Flowers in July.

Wood Hair Grass, or Common Hair Grass, (*aira flexuosa*,) is a common grass on our dry and rocky hills, and road sides, and high upon Wachuset Mountain. The generic name is the Greek *aira*, darnel, or tares, and its characteristics are, two flowered spikelets, in an open diffuse panicle; flowers both perfect, shorter than the glumes, hairy at the base, lower palea three to five nerved, awned on the back, grain oblong, smooth.

Specific characters: Stems slender, one to two feet high, nearly naked, leaves dark green, often curved, bristle-formed, branches of the panicle hairy, spreading, mostly in pairs, lower palea slightly toothed, awn starting near the base, bent in the middle, longer than the glumes, which are purplish—perennial. Flowers in June. This plant is sometimes found 3,500 feet above the level of the sea. Sheep eat it readily. Of no value for cultivation. Fig. 62 represents this grass in blossom, and Fig. 63 a magnified flower of it. It contains when dry but .63 per cent. of nitrogen.

Hassock Grass, (*aira cæspitosa*,) also belongs to this genus

aira. Stems erect, round, roughish, in close tufts, leaves flat, linear, acute, with roughish striated sheaths, upper sheath longer than its leaf, panicle pyramidal or oblong, large, at first drooping, afterwards erect, with branches spreading in every direction; awn barely equalling the palea, outer palea of lower floret shorter than the glumes, membranous, jagged or four-toothed on the summit, hairy at the base, with slender awn rising from a little above the base, and extending scarcely above the palea. Distinguished from *aira flexuosa* in the awn of the lower floret not protruding beyond the glumes of the calyx. In *aira flexuosa* the awn of the lower floret protrudes more than one-third its length beyond the glumes.

Fig. 62. Wood Hair Grass.

It has an unsightly look in fields and pastures, on account of its growing in tufts or clusters or hassocks. Cattle seldom touch it. Prefers stiff or marshy bottoms, where the water stands. June.

Fig. 63.

Water Hair Grass, (*aira aquatica.*) Fig. 64. This grass Mr. Curtis calls the sweetest of the British grasses, and equal to any foreign one. Its stems and leaves, when green, have a sweet and agreeable taste like that of liquorice. Water fowls are said to be very fond of the seeds and the fresh green shoots. Cattle also eat it very readily. It is strictly an aquatic, but can be cultivated on imperfectly drained bogs and muddy bottoms. Not common. It flowers in July.

Fig. 64. Water Hair Grass.

Fig. 65. Downy Oat Grass.

WILD OAT GRASS, WHITE TOP, (*danthonia spicata*,) is common in dry, sunny pastures, with a stem one foot high, slender, with short leaves, narrow sheaths, bearded; panicle simple, spikelets seven flowered, lower palea broadly ovate, loosely hairy on the back, longer than its awl-shaped teeth—perennial. Flowers in June. It is called white top in some localities, but is not the grass most commonly known by that name—the agrostis alba.

Downy Persoon, (*trisetum mollis*,) is a grass with dense panicles, much contracted, oblong or linear, awn bent or diverging, lower palea compressed, keeled, leaves flat and short; found on rocky river banks and mountains, about one foot high. It flowers in July. Of no agricultural value.

The Downy Oat Grass, (*trisetum pubescens*,) is a very hardy perennial grass, naturalized on chalky soils, and on such soils its leaves are covered with a coating of downy hairs which it loses when cultivated on better lands. It is regarded as a good permanent pasture grass on account of its hardiness and its being but a slight impoverisher of the soil, and yielding a larger per cent. of bitter extractive than other grasses grown on poor, light soils. It is therefore recommended abroad as a prominent ingredient of mixtures for pastures. It flowers early in July. Fig. 65 represents this plant as it appears in blossom. Formerly classed as *avena pubescens*.

Meadow Oat Grass, (*avena pratensis*, Fig. 66,) is a perennial grass, native of the pastures of Great Britain, growing to the height of about eighteen inches. It furnishes a hay of medium quality. Flourishes best on dry soils. Flowers in July. Figs. 67 and 68 represent the flowers of this grass magnified.

The Yellow Oat Grass, (*avena flavescens*, now generally classified as *trisetum flavescens*,) can scarcely, perhaps, be regarded as naturalized here. It is a perennial plant of slow growth and medium quality, furnishing a hay containing about 1.79 per cent. of azote or nitrogen; suitable for dry meadows and pastures. It is sometimes regarded as a weed, growing about eighteen inches high. It fails if cultivated alone, but succeeds with other grasses, and is said to be the most useful for fodder, of the oat grasses. It grows best with the crested dog's tail and sweet scented vernal. It contains a larger proportion of bitter extractive than most other grasses, and for that reason is recommended by some English writers as a valuable pasture grass. It flowers in July. Fig. 69 represents this grass, and Fig. 70 a flower of it magnified.

Tall Meadow Oat Grass, or Tall Oat Grass, (*arrhenatherum avenaceum*,) is the avena elatior of Linnæus. Specific characters: Spikelets open panicled, two flowered, lower flower staminate, bearing a long bent awn below the middle of the back; leaves flat, acute, roughish on both sides, most on the

Fig. 66. Meadow Oat Grass.

Fig. 67.

Fig. 68.

Fig. 70.

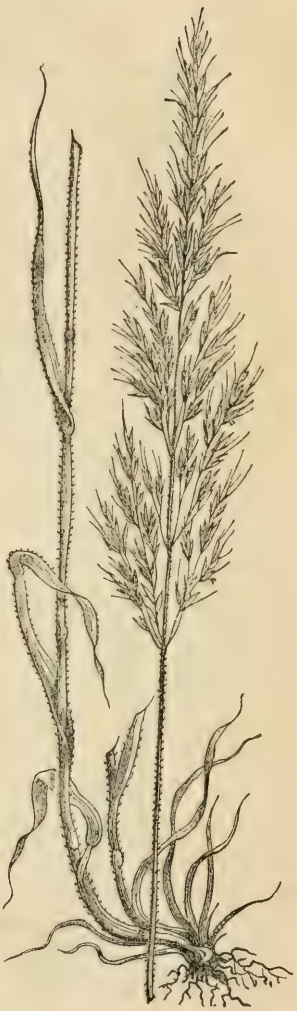


Fig. 69. Yellow Oat Grass.

inner; panicle leaning slightly on one side, glumes very unequal; stems from two to three feet high, root perennial, fibrous, sometimes bulbous. It is readily distinguished from other grasses by its having two florets, the lower one having a long awn rising from a little above the base of the outer palea. Introduced. Flowers in June and July. Shown in Fig. 71. A magnified spikelet is seen in Fig. 72.

This is the Ray grass of France. It produces an abundant

Fig. 72.

Fig. 74

Fig. 71. Tall Meadow Oat Grass. Fig. 75. Fig. 73. Meadow Soft Grass.

supply of foliage, and is valuable either for hay or for pasture, and has been especially recommended for soiling purposes, on account of its early and luxuriant growth. It is often found on the borders of fields and hedges, woods and pastures, and sometimes very plenty in mowing lands. After being mown it shoots up a very thick aftermath, and on this account, partly, is regarded as nearly equal for excellence to the common foxtail, (*alopecurus pratensis.*)

It grows spontaneously on deep, sandy soils, when once naturalized. It has been cultivated to some extent in New England, and is esteemed by those who know it, mainly for its early, rapid and late growth, making it very well calculated as a permanent pasture grass. It will succeed on tenacious clover soils.

Meadow Soft Grass, Velvet Grass, (*holcus lanatus*,) has its spikelets crowded in a somewhat open panicle, and an awn with the lower part perfectly smooth. The generic characters are, two flowered spikelets jointed with the pedicels, glumes boat-shaped, membranaceous, inclosing and exceeding the flowers; lower flower perfect, its lower palea awnless and pointless, upper flower staminate only, bearing a stout bent awn below the apex. Stamens three; grain free, slightly grooved.

This species grows from one to two feet high, stem erect, round, root perennial, fibrous, leaves four or five, with soft, downy sheaths, upper sheath much longer than its leaf, inflated, ligule obtuse, joints usually four, generally covered with soft, downy hairs the points of which are turned downwards; leaves pale green, flat, broad, acute, soft on both sides, covered with delicate slender hairs. Inflorescence compound panicled, of a greenish, reddish or pinkish tinge; hairy glumes, oblong, tipped with a minute bristle. Florets of two paleæ. Flowers in June. Introduced. In Fig. 73 is seen a drawing of this grass, and in Figs. 74 and 75, its flowers magnified.

This beautiful grass grows in moist fields and peaty soils, but I have found it on dry, sandy soils on Nantucket, and specimens have been sent me from Boxford and other places where it grew on upland fields, and was cultivated with other grasses. It is productive and easy of cultivation. It is of but little value either for pasture or hay, cattle not being fond of it. When once introduced it will readily spread from its light seeds which are easily dispersed by the wind. It does not merit cultivation except on poor, peaty lands, where better grasses will not succeed. This grass loses about .63 of its weight in drying, and the hay contains about 1.92 per cent. of nitrogen.

The Creeping Soft Grass, (*holcus mollis*, Fig. 76,) not yet naturalized here. It is of no value, and is regarded as a troublesome weed. Distinguished from the preceding by its

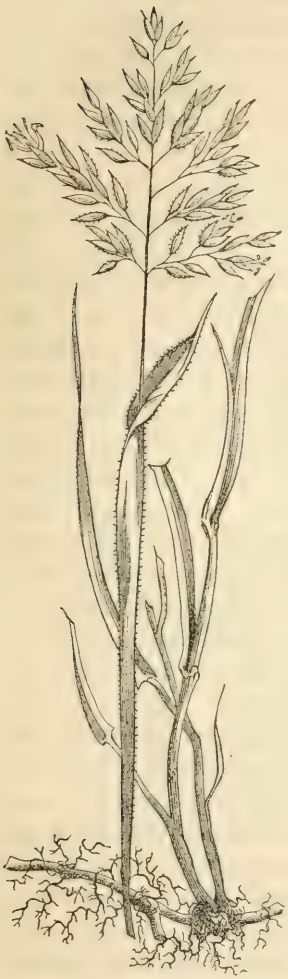


Fig. 76. Creeping Soft Grass.

Fig. 77.

Fig. 78.

Fig. 80.

Fig. 81.

Fig. 79. Sweet-scented Vernal.

awned floret and its creeping root. The flowers of this grass are seen magnified in Figs. 77 and 78.

Seneca Grass, or Vanilla Grass, (*hierochloa borealis*,) has spikelets three flowered, flowers all with two paleæ, branches of the panicle smooth; grows from twelve to eighteen inches high. Stems erect, round, smooth, panicle somewhat spreading, rather one sided, leaves short, broad, lanceolate, rough on the inner side, smooth behind; spikelets rather large.

Grows in wet meadows. Flowers in May. Common and generally diffused, but of no value for cultivation, on account of its powerful, creeping roots and very slight spring foliage. It derived its generic name, *hierochloa*, holy grass, from two Greek words, signifying sacred grass,—from the fact that it was customary to strew it before the doors of the churches on festival and saint's days, in the north of Europe. In Sweden it is sold to be hung up over beds, where it is supposed to induce sleep.

Sweet Scented Vernal Grass, (*anthoxanthum odoratum.*) Specific characteristics: Spikelets spreading, three flowered, lateral flowers neutral, with one palea, hairy on the outside and awned on the back; glumes thin, acute, keeled, the upper twice as long as the lower; seed ovate, adhering to the palea which incloses it; root perennial. Flowers in May and June. Stems from one and a half to two feet high. Introduced from Europe. This grass is seen in Fig. 79.

This is one of the earliest spring grasses, as well as one of the latest in the autumn. It is almost the only grass that is fragrant. It possesses a property peculiar to this species, or possessed by only a few others, known as benzoic acid. It is said to be this which not only gives it its own aromatic odor, but imparts it to other grasses with which it is cured. The green leaves when bruised give out this perfume to the fingers, and the plant may thus be known. It possesses but little value of itself, its nutritive properties being slight; nor is it much relished by stock of any kind, but as a pasture grass on almost all soils, and with a large mixture of other grasses, it is very valuable for its early growth, and this gives it the character of a permanent pasture grass.

It is not uncommon in our pastures and road sides, growing as if it were indigenous. I have found fine specimens of it on dry soils at Nantucket and elsewhere.

The aftermath or fall growth of this beautiful grass is said to be richer in nutritive qualities than the growth of the spring. Though it is pretty generally diffused over the country, it is only on certain soils that it takes complete possession of the surface and forms the predominant grass in a permanent turf, as it is said to do in some sections around Philadelphia. The flavor of the spring butter sold in that city is ascribed by some

to the prevalence of this grass. There seems to be nothing inconsistent in this supposition, since it is well known that disagreeable flavors are often imparted to the milk and the butter by the substances taken as food by the cow, as turnips, for instance, or cabbages, or cauliflowers; and if an objectionable flavor may be imparted by one substance, it is reasonable to suppose an opposite flavor may be given by another. Much, of course, depends on the manufacture; as poor butter is found in the Philadelphia market, as in any other, while as good could be, and is found, in the Boston market as any in the world. The best butter, I learn on inquiry, is as expensive in the former city as elsewhere, while it is true that a high price will command and obtain a good article wherever the art of butter making is at all understood.

I am informed by Dr. Emerson, of Philadelphia, to whom I am indebted for valuable specimens of this grass, that he has made experiments in flavoring other grasses with a slight addition of benzoic acid in the form of an essence, previous to feeding them out to milch cows, and that the flavor of the best Philadelphia spring butter was thus imparted to the butter made from them.

A curious and beautiful peculiarity is exhibited in the seeds of this grass, by which they are prevented from germinating in wet weather after approaching maturity, and thus becoming abortive. The husks of the blossom adhering to the seed when ripe, and the jointed awn by its spiral contortions, when affected by the alternate moisture and dryness of the atmosphere, act like levers to separate and lift it out from the calyx even before the grass is bent or lodged and while the spike is still erect. If the hand is moistened and the seeds placed in it, they will appear to move like insects, from the uncoiling of the spiral twist of the awns attached to them.

The flowers of the sweet scented vernal grass are seen in Figs. 80 and 81. There are 923,200 seeds in a pound, and eight pounds in a bushel. It cannot be said to belong to the grasses useful for general cultivation.

Reed Canary Grass, (*phalaris arundinacea.*) Generic characteristics: Spikelets crowded in a dense or spiked panicle, perfect flower flattish with two neutral rudiments of flowers, one

on each side at its base, awnless, two shining paleæ, closely inclosing the smooth, flattened grain; stamens three.

Specific description: panicle very slightly branched, clustered, somewhat spreading when old, but not so much generally, as appears in Fig. 82; glumes wingless, rudimentary florets hairy, stem round, smooth, erect, from two to seven feet high, leaves five or six in number, broad, lightish green, acute, harsh, flat, ribbed, central rib the most prominent, roughish on both surfaces, edges minutely toothed, smooth, striated sheaths. Flowers in July. Grows on wet grounds by the sides of rivers and standing pools, best suited to somewhat tenacious soils.

Fig. 82. Reed Canary Grass.

Fig. 83.

A beautiful variety of this species is the Ribbon or Striped Grass of the gardens, familiar to every one. The reed canary grass grows in the utmost luxuriance at the State Farm, at Westborough, and produces a large and early crop. It will bear cutting two or three times in a season, but if not cut early, the foliage is coarse. Cattle are not fond of it at any stage of its growth, but if cut early and well cured, they will eat it in the winter if they can get nothing better. For some experiments with this hay in comparison with others, see p. 61.

This grass is common in low, rich soils where the water is either standing or sluggish, and is not unfrequently produced by transplanting the roots of the striped grass into suitable soils. In one instance within my knowledge, it came in and produced an exceedingly heavy crop, simply from roots of ribbon grass

which had been dug up from a garden and thrown into the brook to get them out of the way. Several other instances of a smilar nature have also come to my notice. One farmer has propagated it extensively in his wet meadows by forcing the ripe seed panicles into the mud with his feet. As the stripe of the ribbon grass is only accidental, dependent on location and soil, it constitutes only a variety of the reed canary grass and loses the stripe when transferred to a wet and muddy soil.

The cut, Fig. 82, was made from a specimen too far advanced to show this grass as it ordinarily appears; the panicle or head is too spreading and not sufficiently long. I have fine specimens with panicles three times as long as appears in the drawing, and more in the shape of a spike of Timothy.

To ascertain the exact nutritive qualities of this grass when cured as hay, a careful analysis has been made at my request, by Prof. E. N. Horsford, of Cambridge, with the following result: Of water, the specimen contained 10.42 per cent.; ash, 5.31 per cent.; nitrogen, .55 per cent.; nitrogenous ingredients, flesh forming principles, 3.53 per cent.; woody fibre, starch, gum, sugar, &c., 80.73 per cent.* It will be seen by

* The following are the details of this valuable analysis:—

1st. Of the Leaves stripped from the Culms or Stalks;
2d. Of the Stalks from which the Leaves and Joints were removed; and
3d. Of the Joints.

Weight of different portions of the Plant.

		Grammes.	Av. Gr's.
I.	Leaves of four Stalks, air-dried, weighed,	2.9239	2.8989
II.	" " " " "	2.8740	
I.	Four Stalks, without Joints, or Leaves, air-dried, weighed,	4.1167	3.6592
II.	" " " " "	3.2018	
I.	Joints of four Stalks, air-dried, weighed,	.5161	.4624
II.	" " " "	.4088	
	Average Total,	7.0205 Grammes.	
	Average weight of Stalks with Leaves and Joints,	1.7551 Grammes.	

Water Determination.

I. Of the Leaves, .9234 grammes lost at a temperature of 212° Fah. .1014 grammes—equal to 10.98 per cent.
II. Of the Stalks, 1.9836 grammes lost at 212° Fah. .1902 grammes—equal to 9.58 per cent.
III. Of the Joints. 2.4529 grammes lost at 212° Fah. .2630 grammes—equal to 10.72 per cent.

Ash Determination.

I. Of the Leaves, air-dried, 2.9239 grammes gave .2590 grammes Ash—equal to 8.85 per cent.
II. Of the Stalks, air-dried, 4.1167 grammes gave .1475 grammes Ash—equal to 3.58 per cent.
III. Of the Joints, air-dried, .5161 grammes gave .0181 grammes Ash—equal to 3.50 per cent.

reference to a subsequent page, containing analyses by Prof. Way, that this grass is very far inferior to many other grasses examined by him. The panicles of this grass if allowed to stand after the time of flowering, become filled with ergot, or long, black spurs, issuing from between the glumes, and occu-

None of the above ashes effervesced with acid, indicating the absence of carbonates. They gave but the faintest reaction for lime. Indeed microscopic, as well as chemical examination, showed the Ash to be composed almost entirely of Silica.

Nitrogen Determination.

I. Of the Leaves, 1.4370 grammes, air-dried, gave .2600 grammes of Platina Chloride of Ammonium—equal to 1.13 per cent. of Nitrogen, and 7.21 per cent. of Nitrogenous ingredients.

II. Of the Stalks, air-dried, 1.6009 grammes gave .0205 grammes Platina Chloride of Ammonium—equal to .08 per cent. of Nitrogen, and .51 per cent. of Nitrogenous ingredients.

III. Of the Joints, air-dried, 2.4529 grammes gave .1789 grammes Platina Chloride of Ammonium—equal to .45 per cent. of Nitrogen, and 2.87 per cent. of Nitrogenous ingredients.

The preceding results, in tabular form, appear as follows:—

Relative Weight of different portions.

	Average	of one	percentage.
Leaves of four Stalks,	2.8989 grammes.	.7247 grammes.	41.29
Four Stalks,	3.6592	.9148	52.12
Joints of four Stalks,	.4624	.1156	6.59
			100.00

Average weight of one plant without the roots, ... 1.7551 grammes.

Percentages.

	Water.	Ash.	Nitrogen.	Nitrogenous Ingredients.*	Woody Fibre, Starch, Sugar, &c.
Leaves,	10.98	8.85	1.13	7.21	72.96
Stalks,	9.58	3.58	.08	.51	86.33
Joints,	10.72	3.50	.45	2.87	82.91

For comparison as to the relative nutritive values, there follow some determinations made of hay from several localities by Henneberg and Thos. Way.

Hay analyzed gave	Nitrogen.	Nitrogenous Ingredients.
For Leaves, 1.13		
For Stalks, .08	5.71 per cent.†	3.53 per cent.
For Joints, .45		
Clover,	1.57	10.01 "
Hay, No. 1, saline soil,	1.49	9.51 "
" No. 2, May,	1.39	8.87 "
" " June,	1.49	9.51 "
" " October,	1.70	10.85 "

It will be seen that some of the samples contain nearly three times as much of Nitrogenous Ingredients as the sample submitted for examination, and it will be inferred from this consideration that, other things being equal, the hay at the head of the list is decidedly inferior in nutritive value.

* Three parts of Nitrogen correspond with 19.16 parts of Nitrogenous Ingredients, as vegetable albumen, fibrin and casein.

† Estimated according to percentages of different parts.

pying the place of grain. This, if there were no other reason, would be sufficient to determine that it should be cut at or before the time of flowering. I have never seen rye worse affected than my specimens of this grass are. The effects of this mysterious disease are well known. The noxious power it exerts on the system of animals which receive even a small portion of it, is oftentimes dreadful, producing "most horrible gangrenes, rotting of the extremities, internal tortures and agonizing death; it has been known to slough and kill not a few human beings who have accidentally or inadvertently eaten grain or flour infected with it."

The flower of the reed canary grass is shown in Fig. 83. The variety called striped grass, (*colorata*,) is exceedingly hardy and may be propagated to any extent by dividing and transplanting the roots. In moist soil it spreads rapidly and forms a thick mass of fodder which might be repeatedly cut without injury, though it is of little value for feeding stock.

The Common Canary Grass, (*phalaris canariensis*,) is cultivated in gardens, and to some extent in fields and waste places for the sake of the seed for the canary bird. It has a spiked, oval panicle, glumes wing-keeled; rudimentary flowers smooth and half the length of the perfect one. Flowers in July and August.

Millet Grass, (*millium effusum*,) is found growing commonly in moist, shady woods, mountain meadows, and on the borders of streams. Panicle widely diffuse, compound, glumes ovate, very obtuse, leaves broad and flat, thin, root perennial, flower oblong. Flowers in June. Introduced. Of no value for cultivation, the foliage possessing but slight nutritive qualities. The seeds are sought by birds. It will thrive transplanted to open places.

Hairy Slender Paspalum, (*paspalum setaceum*,) has an erect or decumbent, slender culm, from one to two feet high, leaves and sheaths hairy, spikes slender, smooth, mostly solitary on a long peduncle, spikelets narrowly two rowed. Flowers in August. It is found on sandy fields and plains near the coast, and is rather common.

Slender Crab Grass, (*panicum filiforme*,) is another species of the subgenus digitaria, or finger grasses, and resembles the last somewhat, but the *upper glume equals the flower*, while the

lower is nearly wanting, and the spikes are more erect. It flourishes on sandy, dry soils, especially near the coast. Flowers in August. Of no value for cultivation.

Smooth Crab Grass, (*panicum glabrum*,) resembles the last, with the spikes digitate, three to four, spreading, rachis flat and thin, spikelets ovoid. It is common in cultivated grounds and waste places, on sandy fields. Flowers in August and September. A troublesome weed.

Finger Grass, Common Crab Grass, (*panicum sanguinale*.) The panic grasses are widely spread and common over the State. The generic characters are, two flowered panicled spikelets, flowers with or without awns, glumes two, lower one short or minute, the upper long as the fertile flower, upper flower perfect, closed, flattish, awnless, stamens three.

The stems of the finger grass are from one to two feet high, erect, spreading, leaves and sheaths hairy, spikes four to fifteen, digitate, upper glume half the length of the flower, lower one small. This grass grows on waste or neglected cultivated grounds and gardens, and yards, and is generally regarded as a troublesome weed. Introduced. Flowers from August to October.

Agrostis-like Panic Grass, (*panicum agrostoides*,) differs from the preceding species in having the stems flattened, upright, two feet high, leaves long, sheaths smooth, spikelets on the spreading branches crowded and one sided, *ovate*, *oblong*, *acute*, purplish. It is common on wet meadows and borders of rivers. Flowers in July and August.

Prolific Panic Grass, (*panicum proliferum*,) grows on brackish marshes and meadows, and is common along the coast. It sometimes appears on dry places. Cattle are fond of it. Differs from the preceding in having culms thickened, succulent, branched and bent, ascending from a procumbent base, and spikelets appressed, lance-oval, of a pale green color.

Hair Stalked Panic Grass, (*panicum capillare*,) grows in sandy soils and cultivated fields every where. Its culm is upright, often branched at the base, and forming a tuft, sheaths flattened, very hairy, panicle pyramidal, hairy, compound and very loose, spikelets scattered on long pedicels, oblong, pointed. Flowers in August and September.

Tall Smooth Panic Grass, (*panicum virgatum*.) Stems

upright, three to five feet high, leaves very long, flat, panicle large, loose and compound, branches spreading when grown, and drooping, spikelets scattered, oval, pointed, glumes usually purplish. Grows pretty commonly in moist, sandy soils, and flowers in August.

Broad-leaved Panic Grass, (*panicum latifolium.*) This is a grass with a perennial, fibrous root, and stem from one to two feet high, and leaves broad, long, taper-pointed, smooth or slightly downy, branches of panicle spreading, spikelets long, obovate, downy. Flowers in June and July. It is common in moist thickets and woods. Of no value for cultivation.

The Hidden-flowered Panic Grass, (*panicum clandestinum,*) the Yellow Panic Grass, (*panicum xanthophysum,*) the Polymorphus Panic Grass, (*panicum dichotomum,*) the Few-flowered Panic Grass, (*panicum depauperatum,*) the Warty-flowered Panic Grass, (*panicum verrucosum,*) are sometimes found, the first, in low thickets and along the banks of rivers, not very common; the second, on dry and sandy soils, pine plains, rare; flowers in June; the third, in dry and low grounds, not very common, flowers in June and July; the fourth, on dry, sandy hill-sides, more common than the preceding; the fifth, in sandy swamps, near the coast. None of these are valuable for cultivation, nor are they troublesome as some of the preceding species of panic are, on account of their places of growth.

Barn Grass, or Barnyard Grass, (*panicum crus-galli,*) is more common. Its spikes are alternate and in pairs, sheaths smooth, rachis bristly, stem from two to four feet high, stout, erect, or somewhat procumbent, leaves half an inch broad, panicle dense, pyramidal, glumes acute, awn variable in length and sometimes wanting, outer palea of the neutral flower, usually awned; one or two varieties have rough or bristly sheaths. It grows on moist, rich or manured soils and along the coast in ditches. Flowers in August, September and October.

Some experiments have been made to cultivate this common species in the place of millet, to cut for green fodder. It is relished by stock and is very succulent and nutritive.

Hungarian Millet, Moha de Hongrie, (*panicum germanicum,*) has been cultivated to some extent in this State, from

seed received through the Patent Office. It is an annual forage plant introduced into France in 1815, where its cultivation has become considerably extended. It germinates readily, withstands the drought remarkably, remaining green even when other vegetation is parched up, and if its development is arrested by dry weather, the least rain will restore it to vigor. It has numerous succulent leaves which furnish an abundance of green fodder, very much relished by all kinds of stock.

It flourishes in somewhat light and dry soils, though it attains its greatest luxuriance in soils of medium consistency and well manured. It may be sown broadcast and cultivated precisely like other varieties of millet. This millet is thought to contain a somewhat higher percentage of nutriment than the common millet, though I am not aware that it has been analyzed. A practical farmer of Worcester county says of it: "I have raised the "Moha de Hongrie," on a small scale only. In my garden it has grown *thick* and *fine*.

"As it is a leafy plant and remains green until its seeds mature, I think it may prove valuable for fodder, both green and dry. It grows and matures in about the same time as the common millet.

"I have now one bushel of seed, grown on six square rods. This quantity will enable me to test it practically, another season."

This plant is seen in Fig. 84, which gives a correct representation of it.

The Bristly Foxtail, (*setaria verticillata*,) is a grass sometimes, though rarely, found about farm houses. It has cylindrical spikes two or three inches long, pale green, somewhat interrupted with whorled, short clusters, bristles single or in pairs, roughened or barbed downwards, short. Not cultivated.

Bottle Grass, sometimes called Foxtail, (*setaria glauca.*) This is an annual with a stem from one to three feet high, leaves broad, hairy at the base, sheaths smooth, ligule bearded, spike two to three inches long, dense, cylindrical, bristles six to eleven in a cluster, rough upwards, perfect flower wrinkled. The spike is of a tawny or dull orange yellow when old. Flowers in July. It is common in cultivated grounds and barnyards. Introduced.

The Green Foxtail, sometimes also called Bottle Grass,

(*setaria viridis*,) has a spike cylindrical, more or less compound, green, bristles few in a cluster, longer than the spikelets, flower perfect, striate lengthwise and dotted. It is common in cultivated grounds.

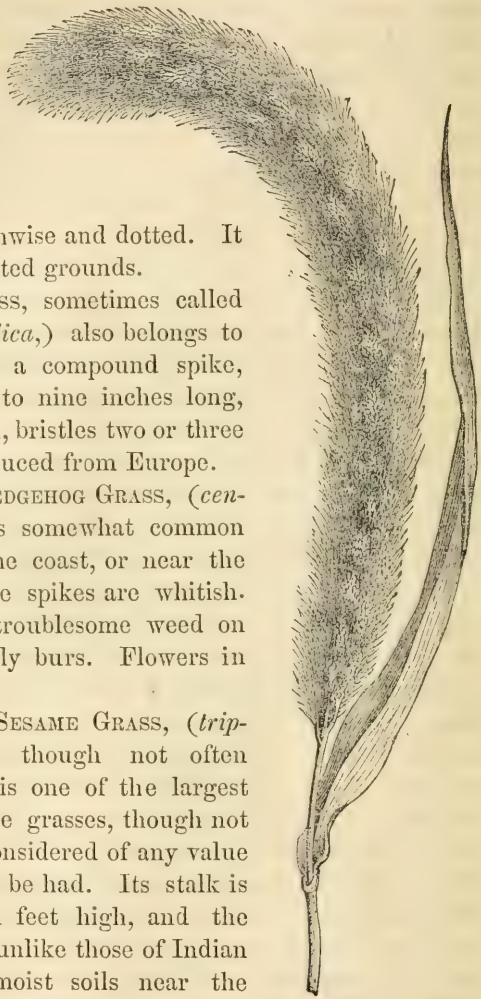


Fig. 84 Hungarian Millet.

The Bengal Grass, sometimes called Millet, (*setaria italica*,) also belongs to this genus. It has a compound spike, thick, nodding, six to nine inches long, yellowish or purplish, bristles two or three in a cluster. Introduced from Europe.

Bur Grass, or Hedgehog Grass, (*cenchrus tribuloides*,) is somewhat common on sandy soils on the coast, or near the salt water, where the spikes are whitish. It is regarded as a troublesome weed on account of its prickly burs. Flowers in August.

Gama Grass, or Sesame Grass, (*tripsacum dactyloides*,) though not often found in this State is one of the largest and most remarkable grasses, though not one that would be considered of any value where better could be had. Its stalk is from four to seven feet high, and the leaves look not very unlike those of Indian corn. Grows on moist soils near the coast. Flowers in August.

Finger-spiked Wood Grass, (*andropogon furcatus*.) Of this genus about sixty species are known to botanists. But few of these are indigenous to this country. Its generic characteristics are, a neuter or staminate lower flower, glumes and paleæ often wanting, upper flower perfect, glumes awnless, lower palea awned. Flowers in panicles and spikes.

Specific description: Stems four feet high, leaves nearly smooth, spikes digitate or generally by threes and fours, lower

flower awnless; the spikelets are roughish, downy, awn bent. Flowers in September. This grass is common on sterile soils, rocky banks and hill-sides. Not cultivated.

Purple Wood Grass, or Broom Grass, (*andropogon scoparius*,) and the Indian Grass, or Wood Grass, (*andropogon nutans*,) grow on sterile and dry, barren soils, and sandy plains, and are common, though of no value for cultivation. They flower from July to September.

The Chinese Sugar Cane, (*sorghum saccharatum.*) Generic characteristics: Panicle open or spreading, spikelets two or three, the lateral ones sterile, the middle or terminal one fertile, glumes tough and hard, sometimes awnless, stamens three.

Specific description: Stem from six to fifteen feet high, according to the soil on which it grows, erect, smooth, leaves linear, flexuous, gracefully curving down at the ends, resembling Indian corn in its early growth, and broomcorn, to which it is nearly allied, at maturity. Flowers in a panicle at the top, at first green, changing through the shades of violet to purple, when more advanced. See Fig. 85, taken from a plant somewhat over seven feet in height.

This plant has lately been introduced and used both for forage and the manufacture of sugar and molasses or syrup. In some instances it has been used for making vinegar, brandy and other liquors. As it is a true grass, and is at present exciting considerable interest throughout the country, it is proper to notice it in this connection.

The genus sorghum embraces over thirty species, most of which originated in Asia, where some of them have been cultivated time out of mind. Specimens of the sorghum saccharatum were introduced into France by means of the seed, about six or eight years ago, where they have been cultivated with considerable success. So far as we know, this species is the best and most valuable for cultivation for the various purposes alluded to, and most of the seeds first used in this country were obtained from France, through the efficient agency of the Patent Office, at Washington, being first cultivated in the spring of 1855.

Any positive assertions with respect to the value of this plant, would, perhaps, be premature, but I have had very good

opportunities of observation upon it, and have met many individuals from different latitudes who have cultivated it with great success, though numerous experiments upon it are still in progress, which will determine its relative value and its modes of cultivation. It is undoubtedly very rich in saccharine matter in all latitudes within the geographical range of Indian corn. It has been said that the percentage of sugar decreases somewhat in the higher latitudes; but this does not seem to have been established as a fact, and the opposite conclusion, will, very probably, be arrived at, even though the percentage of sugar found to be crystalizable should be greater in more tropical regions.

The plant grown in Massachusetts the past year contained about twenty-three per cent. of sugar, while that grown in the District of Columbia contained but fourteen per cent. And this accords with what we know of Indian corn, since it is pretty well established that the corn grown in high latitudes is richer in saccharine matter than that grown at the South. The meal of northern corn is also better, and will bring at all times a considerably higher price in the market.

Of the Chinese sugar cane about seven-eighths of the whole plant consist of juice, especially when grown in a southern latitude where the juice is somewhat more abundant, the cane being more succulent there; and we may readily credit the statement that vinegar has been made from this juice at the rate of fifteen hundred gallons to the acre.

When cut for sugar the most favorable time is just after it has passed the blossom, or when the seed is "in the milk," and if raised for this purpose the time of planting should be later than that of Indian corn. The leaves are stripped off and the stalk is pressed in any convenient mills or rollers, though more suitable mills will undoubtedly be constructed.

Should it be found on more careful trial to be equal to what is reported of it, it will make an entire revolution in the sugar growing interests of the country, and thus become a plant of great national importance. It is said that the crop of sugar raised in Louisiana has gradually decreased from nearly five hundred thousand hogsheads in 1853, to less than one hundred thousand, in 1856, while the price of sugar and molasses—a greater amount of which is consumed in this, than in any other

Fig. 85. Chinese Sugar Cane.

country on the globe, in proportion to the population—is loudly calling the attention of farmers and planters to its production; and the Chinese sugar cane is regarded by some as a substitute for the species of sugar cane most commonly cultivated there, the *saccharum officinarum*.

But I propose to speak of it in this connection mainly as a forage plant, though it may prove perfectly practicable and profitable to cultivate it for the purpose of making sugar and molasses. Some years ago the practice of sowing Indian corn in drills for the purpose of cutting up green for fodder, was recommended by a progressive agriculturist, and though at first ridiculed, it soon came to be planted in small patches of a few rods square, by practical farmers here and there, till now it is regarded as almost an indispensable crop, not only to carry a stock of cattle through a severe summer drought, when our pastures are short and dry, but to cut and cure in large quantities for winter use. The weight and value of an acre of fodder is very great. Of late years there has been an inclination to use sweet corn for this purpose, under the supposition that it possessed a larger quantity of saccharine matter in its stalks and leaves than the yellow varieties. When the use of sweet corn was first recommended, it was said that cattle were so much more fond of it than of yellow corn, that they would select its stalks if tied up in a bundle with the stalks of yellow corn. The same is now asserted of the Chinese sugar cane, and as it comes to me very well authenticated, I see no reason to doubt it.

Of the economy of the culture of corn to feed out green in the manner alluded to, there can be no question, and no thrifty and prudent farmer thinks of neglecting it; for if we suffer from drought, as we are liable to every season, he is sure to regret it. Now if a substitute of superior value can be found, of as easy and simple cultivation, every farmer will avail himself of it. Whether this substitute will be found in the Chinese sugar cane, remains, perhaps, to be proved; but so great has been its success thus far as to lead us to anticipate its adoption and extensive cultivation for that purpose. In one case authentically reported, nearly ten tons of fodder were raised on an acre, cut up and cured, and weighed three months after cutting. This is not at all surprising when we consider

that even larger yields of Indian corn have been and are frequently obtained, when raised, cut and cured in the same manner.

When grown for fodder, two or three cuttings may be obtained from it, the first being made just before the time of blossoming, when the plant immediately starts up with a vigorous growth and renews its leaves, and sends up its flowering panicles with great rapidity. No less than five cuttings were obtained in Florida during the last year, but the seasons in more northern latitudes would not admit of so many. It is well known that Indian corn will shoot up the second time in the same manner, when once cut or eaten down while green.

This plant grows best in a dry soil and hot sun, in both of which it can be accommodated as far north as New England. It should be planted at or just after the time of Indian corn, and it will mature its fruit in about one hundred days from the seed. For the purposes of sugar making it is best cultivated on rather poor, warm soils, but for feeding out to fattening animals, it should be cultivated on richer ones. If raised for sugar it is better harvested somewhat late in the season, when the temperature ranges from 45° to 55°, when it is not so apt to suffer from the acetous fermentation to which it will be liable if cut earlier. But if raised mainly for the seed, it would be well to plant it somewhat earlier in the spring, in which case it could be cut earlier in the fall. Though the seed is now exceedingly dear on account of its scarcity and the extensive demand for it, yet it is estimated that it can be raised at the price of oats, fifty and sixty bushels to the acre having been obtained without any extraordinary care. The seed can be made into bread or into a beverage resembling chocolate, or fed to poultry and other farm stock.

The Chinese sugar cane, if sown with a view to obtaining its seed, or to attaining its full and perfect development, should be cultivated in hills after the manner of planting Indian corn, and hoed and cultivated in the same manner; but if sown for fodder, it will be found to yield a more luxuriant crop in drills, as we cultivate Indian corn for that purpose. In the former case, one quart of seed will suffice for an acre as it tillers very much, each seed sending up several shoots or seed bearing stems; in the latter case, a larger quantity would be required.

As a fodder plant it has been found not to increase the quantity of milk, milch cows fed upon it having fallen off very decidedly, while they rapidly increased in flesh, and the quality and richness of the milk was found to be improved. This may, therefore, be found to be an objection to its use with some, to whom the quantity is indispensable and the quality of no consequence; but even such may find it desirable to cure and feed out to cows in winter.

It was raised in Dorchester during the past year from seed raised there the year previous, which is conclusive proof that the seed can be ripened in this latitude so as to germinate, though for all practical purposes it is not material to us whether it will ripen here readily or not, if it is found to do so in the Middle States.

As already intimated, the results of experiments have been successful, and these experiments will be carefully repeated the coming season.

A farmer in the State of New York, whose communication appears in the volume of the Patent Office Report on Agriculture, for 1855, says: "The proper time for planting, I should say, would be the same as that of early corn, as I find it quite hardy, and stalks of it cut down the end of October made fresh shoots after two rather heavy frosts, and still were good for feed. From twenty-five plants I obtained half a bushel of ripe seed.

"The mode of cultivation I would recommend, would be to sow after the ground is well manured and deeply ploughed, in drills four feet apart, the plants two feet asunder in the drills, with not more than one plant in a place, as each sends up from four to six shoots. When the plants are well started, say a foot in height, turn over the earth on each side with a plough, after which keep them clear of weeds with the hoe.

"When well cultivated and in good soil, the plant attains from ten to fourteen feet in height and produces excellent fodder from the root to the top. I believe a heavier weight of nutritious feed for all kinds of cattle can be procured from it in a given space of ground, than from any other plant, and I think it will prove of great benefit to every section of the country where it is introduced, not only as a green feed during the hot months, but after being cut up and cured like the corn plant,

its stalks may be steamed during the winter, and given to horses, oxen or cows, which will commence eating at one end and not leave them till entirely consumed. The seeds, also, I have no doubt, will prove valuable as a feed for poultry, as I find they eat them with avidity. I look upon this plant as of great value as a forage crop, and possibly, it may be profitably cultivated for sugar, as the juice contains nearly ten per cent. of saccharine matter as clear as crystal, and on a very small scale, beautiful clarified sugar was produced by my friend Dr. Ray."

Other statements are equally unqualified in the expression of confidence in the value of this plant. I subjoin the following practical suggestions on the cultivation of it, from a valuable little manual by Mr. Hyde, of Newton Centre, who has experimented with it. He says:—

"Select a warm and dry soil, such as you would select for Indian corn.

Prepare your ground precisely as you would for corn, either by spreading your manure, or putting in hills,—about the same distance between the hills, where the ground is rich.

In planting, which should be done early, put into each hill six or eight seeds. Cover lightly with well pulverized soil,—say, three-fourths to one inch deep; pull out all but four or five at second hoeing. If planted in drills, seed enough should be used so that after hoeing there may be a stalk to every four or five inches; from a pound and a half to two pounds of seed should be used.

Cultivate and hoe as with corn; care should be taken that the ignorant do not hoe up the young plants, taking them for barn-grass, which they very much resemble.

When the panicles appear they should be cut off of all that which is intended for sugar or syrup making.

When the plant has just passed into bloom, the stalk may be used for syrup, but will continue to grow better until the seed is in the milk-stage, or little later.

The stalks should be cut close to the ground, with a bill-hook or some such tool, and stripped of their leaves, and the green, succulent top cut off, when they are ready for the mill; the leaves and top may be fed green to cattle, or dried.

The stalks should be passed through the mill twice or more, until most or all of the juice is expressed.

The juice should not be allowed to stand long after being expressed, but boiled at once, if possible. A slow fire should be made under the kettle,—which should be of brass, or much better of copper,—and the juice should not be allowed to boil until the green scum has all been taken off. Lime-water may be used to aid in clarifying and to neutralize the acid; the exact quantity is not yet determined, but to every five gallons of juice, say from one to two teaspoonfuls of powdered lime, or the same dissolved in water, and strained, before being put into the juice.

When all the green scum has been removed, the fire may be increased, and the juice boiled down until nearly as thick as common molasses in hot weather, when, if intended for syrup, it should be removed from the fire, for this completes the process. If intended for sugar, it should be allowed to boil longer, and until it will 'string into threads,' or present an appearance of being sufficiently boiled to grain, when it should be thrown off into troughs, or coolers, at once. I am not able to give exact information in regard to the time it should be boiled to crystallize readily. Further experiments will determine.

If made into sugar, it should be removed from the coolers to casks with holes bored in them, so that the molasses may drain off and leave the sugar dry, as it should be. These casks are generally placed on timbers, with a cement cistern underneath to hold the drippings, or molasses. After remaining in the 'purgery' until sufficiently drained, it comes out fit for sale, or use.

If cultivated exclusively for fodder, it should be planted as early as the weather will allow, and quite as thick as stover-corn. When the panicles appear, or even before, it may be cut either for soiling or for drying, and the roots will at once throw up another crop.

If it is desired, the juice may be fermented, like the juice of apples, being put into casks at the mill, and treated like cider.

The begass, or waste, may be dried and used for fuel, or for making paper, or rotted down for manure.

If the storms should blow down the seed-cane, no fears need be entertained, as it will remain weeks in that condition without

injury. I must here caution all persons who grow this cane against planting it in the vicinity of broomcorn, Dourah corn, or Guinea corn; for it readily mixes with these plants, and it would render the seed worthless for planting."

As already suggested, more accurate investigations are required to determine the relative importance of this plant for the various economical purposes alluded to. If it should be found, on chemical analysis, that the large percentage of saccharine matter in the plant consists of what is called glucose, a substance of comparatively little value, incapable of crystallization to any extent, instead of a saccharine substance capable of easy granulation, it would very materially affect the value of the plant for the purposes of sugar making, but could hardly affect its real value as a forage plant. This point will soon be determined.

If, as has been stated, it is found to be suitable for the manufacture of alcoholic liquors, it should, perhaps, be regarded by the philanthropist as an important addition to our cultivated crops. It is well known that enormous quantities of our best grains are now withdrawn from their legitimate use as food for man, for the manufacture of these articles. Many distilleries use upwards of two thousand bushels of Indian corn or other grains, on an average, every day, and the consumption of grain for these purposes throughout the country is incredibly large.

The Chinese sugar cane will probably be found to be an exhauster of land, requiring large quantities of the phosphates and silicates of the soil for the development of the hard coating of its stems. It has been estimated that nine tons of it to the acre would take from the soil fourteen hundred pounds of mineral substances. This would seem to indicate a dry, gravelly, or a sandy soil, as best suited to supply it wants.

Indian Grass, Wood Grass, (*sorghum nutans*,) is a grass sometimes found on our dry, sterile soils, with a panicle oblong, somewhat compressed, from six to ten inches long, stem from three to five feet high, leaves linear, grayish, sheaths smooth, spikelets light brown and glossy, drooping when mature, hairy at the base, awn twisted. It flowers in August.

Indian Millet, (*sorghum vulgare*,) is a cultivated species and has several well marked varieties, one of which is the Broom-

CORN. It is called Guinea corn in the West Indies, Dourah in Arabia, and Nagara in the north of China. It is sometimes used as a forage plant.

As already intimated, more than thirty species supposed to belong to this genus are known to have been introduced into France, though it is very probable that a more accurate classification will distribute many of them among the other genera.

The tall cereal which has long been cultivated in the south of Europe and in Barbary, under the general name of sorghum, resembles Indian corn in quality, and is often called *small maize*. Its stems contain a pretty large per cent. of saccharine matter, and it is useful to cut green as a forage plant.

Indian millet, when raised on good soil and under favorable circumstances, is said to yield a larger quantity of seed to the acre than any other cereal grass known, not excepting even Indian corn. Its nutritive quality is nearly equal to that of wheat. The common millet is the *panicum miliaceum*.

INDIAN CORN, MAIZE, (*zea mais*,) is a well known plant of American origin, a true grass, and one of the most beautiful and useful of this great family. Its value as a forage plant has already been alluded to in speaking of the Chinese sugar cane, and need not be dwelt upon here. Subject as we are, to the severest droughts, which parch up and essentially injure our pastures, this plant has been found to be of the utmost importance to cut up green, affording an abundant and nutritious fodder, exceedingly succulent and greatly relished by cattle of all kinds, keeping them in good condition, while without this or some similar substitute our stock would inevitably suffer.

The varieties cultivated for the purpose of fodder should be those with the largest and most succulent leaves. Some of the varieties of sweet corn are usually preferred, but on this point farther and more accurate investigations are greatly needed.

It is estimated that on an average from six to eight tons of dry fodder may be procured from an acre sown in drills and properly cultivated, and that this would be equal to about four or five tons of good hay. This is a reasonable estimate, as far larger crops are often obtained.

The particular advantage of raising what are called forage plants, either to cut up green for soiling or to cure for winter use, over our ordinary mowing lands is, that they give on the

same extent of land a far larger amount of nutriment for animals. They give this product immediately, or at least, in a very few months from the time of sowing, while permanent mowing lands, or the perennial grasses, require a great length of time to arrive at perfection, varying from one to four or five years. The amount of fertilizing materials drawn from the air and stored away in the soil by means of the roots, and capable of benefiting the crops of the succeeding year is very considerable, while, in the natural grasses, it remains under the turf and does not come into use till the sward is broken and submitted to culture. We may choose for forage culture plants which start up early in spring and are capable of being used even before the natural grasses have attained a size to make them particularly valuable for grazing.

Besides, the mass of manure which may be made from the product of an acre of land by the use of forage plants, owing to the increased yield, over and above what would be obtained from the same acre in the natural grasses, is an item too rarely taken into the account.

Moreover the plants usually called forage plants, like the clovers, lucerne and green corn fodder, may have some advantage over root culture, their expense being generally less, their product, dried, more easily stored, and kept with less danger of injury and decay, and the mode of feeding out to animals attended with less trouble.

Red Clover, (*trifolium pratense.*) We have given our whole attention, in the preceding pages, to what are strictly and properly called the natural grasses. We now come to consider, very briefly, the artificial. Curious as it may appear, the artificial grasses were cultivated first in point of time, in England, the red clover having been introduced and grown there about the year 1633; sainfoin, 1651; yellow clover in 1659, and white clover about the year 1700; while not one of the natural grasses was cultivated till nearly a century later, with the exception of perennial rye grass, first cultivated in 1677. About the year 1759 the custom of sowing the chaff and seed dropped from the hay stack, along with the artificial grasses and rye grass began, and soon after—between 1761 and 1764—the cultivation of Timothy and orchard grass was introduced from America. The culture of the bent grasses, the sheep's fescue

and the crested dog's tail, began soon after. In 1766, the London Society for the Encouragement of Arts offered premiums for the collection of the seeds of some of the grasses then found growing wild, such as the meadow foxtail, the meadow fescue, the sweet scented vernal grass, &c., and in 1769 the same society offered additional rewards for farther investigations and experiments on the culture and comparative value of the natural grasses. But little was done, however, till the experiments undertaken by the Duke of Bedford, in 1824.

In this country the extensive and practical cultivation of the natural grasses seems to have been commenced at an earlier date than in England, for Jared Eliot, writing about the year 1750, speaks of the culture of Timothy as having been adopted sometime previously. Indeed, the necessities of our rigorous climate compelled attention to this branch of husbandry soon after the establishment of the colony, in 1620. The climate of England, on the other hand, admitted a greater degree of reliance on the wild luxuriance of nature, and this mode of management was brought over by the first settlers and attempted for some years, the few cattle they had being kept on poor and miserable swale hay, or often upon the hay obtained from the salt marshes. The death of their cattle from starvation and exposure was of very common occurrence, and not unfrequently the farmer lost his entire herd. The treatment of animals now, as they were treated during the whole of the first century of the colony, would make the owner liable to prosecution for cruelty. This treatment was, in part, owing to the poverty of the settlers, but more, probably, to the ideas and practices in which they had been early trained in a different climate. Fortunately for the poor dumb beast a more enlightened policy now governs the mass of men, and this policy has led to greater care and attention to the cultivation of the grasses.

But in this country, the culture of the natural grasses takes the precedence in point of time from the causes already indicated, and the minds of men are so influenced by the routine of ordinary practice, that the introduction of clover in the early part of the last century met with great prejudice, which is now nearly, if not quite extinct.

Red clover, though not properly included in the family of

grasses, is now not only extensively cultivated, but is found to be one of the most valuable and economical forage plants. It belongs to the pulse family, or *leguminosae*, which includes the larger portion of forage plants called artificial grasses, in distinction from the gramineae, the true, and often called the natural grasses. The generic name, trefoil, or trifolium, is derived from the Latin *tres*, three, and *folium*, a leaf; and the genus can generally be very readily distinguished by the number and arrangement of its leaves in three leaflets, and flowers in dense, oblong or globular heads.

Specific description: Stems ascending, somewhat hairy, leaflets oval or obovate, often notched at the end and marked on the upper side with a pale spot, heads ovate and set directly upon the stalk instead of upon branches. This species is regarded as by far the most important of the whole genus. It has sported into a number of varieties, one of which is biennial, another perennial, the latter by long cultivation becoming biennial, while the former,—as is true of most biennial and many annual plants,—assumes, to some extent, the character of a perennial and can be made to last three or four years or even more, by simply preventing it from running to seed. This plant is seen in Fig. 86, its leaf is shown in Fig. 87, and its fruit magnified in Fig. 88.

The introduction of clover into England, it is often said, produced an entire revolution in her agriculture, and indeed, when we consider how important a part it plays in our own system of farming, we can with difficulty imagine how our ancestors ever got on at all in farming without it. Be this as it may, it is certain that it led to many of the most important improvements in the rotation of crops. Clover is very properly regarded as a fertilizer of the soil. The action of its long and powerful tap roots is not only mechanical,—loosening the soil and admitting the air,—but also chemical, serving to fix the gases important to enrich the earth, and when these roots decay they add largely to that black mass of matter we call the soil. It serves, also, by its luxuriant foliage, to destroy annual weeds which would spring up on newly seeded land, especially after imperfect cultivation. But one of the most valuable uses of it, and one too often overlooked, is to shade the surface and thereby increase its fertility.

Fig. 86. Red Clover.

Fig. 88.

Fig. 87.

Clover is emphatically a lime plant, and the soils best adapted to it are tenacious or stiff loams. The careful analysis of Prof. Way found no less than 35.39 per cent. of lime in the inorganic constituents of red clover, and that of Boussingault 32.80 per cent., while intelligent practice has arrived so nearly at the same conclusion, that the term "clover soils" is now almost universally used to indicate a tenacious loam, containing more or less of lime in its composition.

Another great advantage in favor of the cultivation of clover, consists in its rapid growth. But a few months elapse from the sowing of the seed before it yields, ordinarily, an abundant and nutritious crop, relished by cattle of all kinds.

Clover seed should always be sown in the spring of the year, in the climate of New England. It is often sown upon the late snows of March or April and soon finds its way down to the soil, where, aided by the moisture of early spring it quickly germinates and rapidly shoots up its leaf stalks.

An accurate and valuable analysis of this plant, both in its green and dry state, will be found in a tabular form on a subsequent page, while a more extended notice of its culture and

the mode of curing it, with the results of practical experience as to its value, will also be given in their proper place.

White Clover, Dutch Clover, Honeysuckle, (*trifolium repens*,) is equally common with the red, and often forms a very considerable portion of the sward or turf of pastures and fields of a tenacious and moist soil. Specific description: Stems spreading, slender and creeping, leaves inversely heart-shaped, flower heads small, white, pods four seeded, root perennial. Flowers from May to September. Fig. 89. A magnified flower is seen Fig. 90.

White clover is widely diffused over this country and all the countries of Europe. It is indigenous probably both to England and America. When first cultivated from seed collected from wild plants, at the beginning of the last century, it was recorded of a farmer that he had "sowed the wild white clover which holds the ground and decays not." Its chief value is as a pasture grass, and it is as valuable for that purpose as the red clover is for hay or for soiling, though there are some who place a low estimate upon it. It easily accommodates itself to a great variety of soils, but grows most luxuriantly in moist grounds and moist or wet seasons. Indeed, it depends so much upon a general distribution of rains through the season, that when they are sufficiently abundant it comes in profusely even where it was not observed in other years, and hence such seasons pass under the term of "clover years." It is not apparently so much relished by stock as from its sweetness we should be led to expect, but it is, on the whole, to be cherished for permanent pastures, and improved, as it undoubtedly may be, by a proper selection and culture of varieties. For an accurate analysis of this plant the reader is referred to a subsequent page.

Lucerne, Alfalfa, (*medicago sativa*, Fig. 91.) This genus of leguminous plants has been known and cultivated from time immemorial. This particular species, lucerne, was brought from Media to Greece in the time of Darius, about five hundred years before Christ, and its cultivation afterwards extended among the Romans, and through them to the south of France, where it has ever since continued to be a favorite forage plant. It does not endure a climate as severe as red clover, requiring greater heat and sunlight; but in a latitude equally suited to

both plants it would be somewhat difficult to say which should have the preference. In some respects it is decidedly superior, as in being perennial, and consequently remaining long in the soil. I have seen fine specimens of it in South Boston, where the seed was sown in 1824, still maintaining its vigorous hold

Fig. 89. White Clover.

Fig. 90.

of the soil and growing with remarkable luxuriance. The crop of lucerne is as abundant as red clover, and is equally well relished by cattle, both green and dry. Its yield of green fodder continues later in the season than that of red clover.

Fig. 91. Lucerne.

Fig. 92.

Lucerne sends down its tap roots in mellow soils, to enormous depths, having been found in sandy soils thirteen feet in length. The leaflets are in threes, obovate, oblong, toothed, the flowers pale blue, violet, or purple, shaped as in Fig. 92, the fruit in downy pods, having two or three twirls, as in Fig. 93.

Lucerne is cultivated in Chili and grows wild in the utmost luxuriance in the pampas of Buenos Ayres, where it is called alfalfa, which is simply the common lucerne, slightly modified by climate, and may be regarded as a variety.

The cultivation of lucerne is somewhat more difficult than

that of clover for the first year, requiring a soil thoroughly mellowed and prepared by clean and careful tillage; and the want of proper attention to this point has led to partial failures in the attempts to raise it in this country. It suffers and languishes in compact clay soils, and does not flourish in light soils lying over an impermeable subsoil, which prevents the water from running off. It will never succeed well on thin soils. But in a permeable subsoil, consisting of loam, or sand or gravel, its roots can penetrate to great depths, and being nearly destitute of lateral shoots, provided with numerous fibrous rootlets, or radical off-shoots, imbibe their moisture and nutriment in layers of soil far below the average of other plants. In this respect it differs materially from clover. For lucerne, a suitable subsoil is of the utmost consequence. For the short lived red clover, a suitable surface soil is more important; a want of care and deep tillage, especially a neglect to break through and loosen up the hard-pan wherever it exists, will inevitably lead to failure with lucerne. But when the soil is suitable, it will produce good and very profitable crops for from five to ten or twelve years, and, of course, it does not belong in the system of short rotations.

But notwithstanding the large quantity of succulent and nutritious forage it produces, its effect is to ameliorate and improve the soil rather than to exhaust it. This apparent anomaly is explained by the fact that all leguminous, broad leaved plants derive a large proportion of their nutritive mate rials from the atmosphere, and that a vast quantity of roots are left to decay in the soil when it is at last broken up, varying, of course, with the length of time the plant continues in the soil, while the luxuriant foliage serves to shade the soil and thus to increase its fertility. Much of this rich foliage is scattered and left to decay, as is the case with all similar plants at the time of harvesting, and the growth of the aftermath is also usually very considerable. The fact that it actually increases the fertility of the soil for other plants, has often been proved and may be regarded as fully established. A soil which would bear only a medium crop of wheat at first, produced a greatly increased quantity after being laid down to lucerne a few years till its roots had enriched the soil.

Lucerne should not follow immediately after having been

grown a few years on the same soil, and then broken up, but after the land on which it has been grown has been cultivated with some other crop or laid down to the natural grasses a length of time equal to that during which it had previously remained in lucerne, it can safely be sown again with it.

The seed of lucerne, when fresh and good, is yellow, glossy and heavy. If the seeds are white, it is an indication that they are not ripe. If they are brown, we may infer that they have been subjected to too strong a heat to separate them from their husks. In either of these cases, it is not safe to purchase or to rely upon them. The same may be said of clover, and it is desirable to try them by a simple method which will be indicated hereafter in speaking of the selection of seed. As the seeds of lucerne are somewhat larger than clover seed and the plant tillers less, it is necessary to sow a larger quantity per acre. It may be sown in the spring along with grain crops, as clover often is, and not a very large crop should be expected the first year.

Lucerne should be cut as soon as it begins to flower, or even earlier. If cut much earlier it is apt to be too watery and less nutritious and cures with greater difficulty; if later, it becomes coarse and hard with woody fibre, and is less relished by cattle. It may be cut and fed green and is an exceedingly valuable plant for soiling cattle, or it may be cut and cured and used like clover hay; but in either case, it must be cut before blossoming.

It is thought by many, that lucerne will not endure the climate of New England, but I do not think it satisfactorily proved, and I have been somewhat minute in speaking of it, in the hope of inducing more careful experiments on a scale and under circumstances sufficient to determine its relative value for us. I am the more anxious on this point from the fact that I am convinced, after much study and observation of our climate, that we should direct our labors in farming more with reference to the frequent droughts of summer to which we are liable every year, and from which there is no immediate and practicable escape except in thorough drainage and deep tillage, which most farmers are unwilling to undertake at present. "When properly managed, the number of cattle which can be kept in good condition on an acre of lucerne, during

the whole season, exceeds belief. It is no sooner mown than it pushes out fresh shoots; and wonderful as the growth of clover sometimes is, in a field that has been lately mown, that of lucerne is far more rapid. Lucerne will last for many years, shooting its roots—tough and fibrous almost as those of liquorice—downwards for nourishment, till they are altogether out of the reach of drought. In the dryest and most sultry weather, when every blade of grass droops for want of moisture, lucerne holds up its stem, fresh and green, as in the genial spring."

I am convinced, also, that the failures of attempts to cultivate lucerne with us may be ascribed, in nearly every instance, to an improper selection of soils, and am inclined to think that a more accurate knowledge of the plant and a more careful observation of its habits of growth would lead to its more general adoption as an economical forage plant.

I have procured fine specimens of lucerne in various parts of this State, where it is very successfully cultivated, but on too limited a scale to determine its comparative value as a farm crop.

Sainfoin, (*hedysarum onobrychis,*) differs from lucerne in many important particulars. It is a leguminous plant with many stems from two to three feet long, straggling, tapering, smooth, leaves in pairs of pointed, oblong leaflets, slightly hairy on the under side, flower stalks higher than the leaves, ending in a spike of crimson or variegated flowers, succeeded by flat, hard pods, toothed on the edges and prickly on the sides, root perennial, and hard and woody. Flowers in July. Fig. 94. The flower is shown in Fig. 95, and the fruit in Fig. 96.

Fig. 96.

Fig 95.

Fig. 94. Sainfoin.

Experiments have been made in introducing and cultivating it in this State, but without success. It requires a calcareous soil.

In the south of France, where it flourishes best, it is considered an indispensable forage plant, improving the quality and increasing the quantity of milk when fed to milch cows, to which it may be given without producing the "hoove," to which they are subjected when allowed to feed freely on green clover and lucerne. Its stalks do not become ligneous if allowed to stand till blossoming, as those of lucerne do. The amount of fodder obtained from it is less than that from clover or lucerne, but its quality, where it can be successfully grown, is better. Its fruit or seed is said to be far more nutritious than oats. They are eagerly sought by fowls, and cause them to lay.

Sainfoin, when green and young, will not endure a severe winter, but after the second or third year will endure a considerable degree of cold. It will succeed in very dry soils, sands and gravels. It is grown with great success in some of the southern counties of England. Its seeds have been generally distributed over the country through the agency of the Patent Office, but, so far as I know, they have been followed by no marked success in the way of crops in New England.

The arrow grasses form a limited family consisting of only three species found in New England. They are arranged in the following table:—

TABLE II. *List of Arrow Grasses. (Juncagineæ.)*

Common Name.	Systematic Name.	Time of Flowering.	Place of growth.
Marsh Arrow Grass. . .	Triglochin palustre, . .	August, .	Marshes, both salt and fresh.
Sea-side Arrow Grass, . .	Triglochin maritimum, .	July, Aug. .	Salt marshes.
Tall Arrow Grass, . .	Triglochin elatum, . .	June, July, .	Swamps in Bridgewater

The second of these, the sea arrow grass, is common in our salt marshes, having rush-like leaves of a sweetish taste, relished by cattle, and forming a very good fodder when well cured.

Many of the rushes or grass-like plants so common along the borders of our ponds, and called grasses in popular language, are readily eaten in the spring while green and full of juice. They are arranged in the following table:—

TABLE III. *List of Grass-like Rushes. (Juncaceæ.)*

Common Name.	Systematic Name.	Time of Flowering.	Place of growth.
Common Wood Rush,	Luzula campestris,	April, May,	Fields and dry woods.
Broad-leaved Hairy Wood Rush,	Luzula pilosa,	May,	Open woods, river banks
Small-flowered Wood Rush,	Luzula parviflora,	July,	Mountains, West. Mass.
Soft Rush,	Juncus effusus,	June,	Swampy grounds: common.
Slender Rush,	Juncus filiformis,	July,	Wet banks and shores.
Baltic Rush,	Juncus balticus,	July,	Sandy shores.
Smaller Round-headed Rush,	Juncus nodosus,	July,	Borders of rivers and ponds.
Many-headed Rush,	Juncus polycephalus,	July,	Wet places.
Sharp-fruited Rush,	Juncus acuminatus,	August,	Boggy swamps.
Brownish-fruited Rush,	Juncus articulatus,	– –	Wet places.
Conrad's Rush,	Juncus Conradi,	July, Aug.	Borders of ponds in sandy soil.
Toad Rush,	Juncus bufonius,	June, Aug.	Low grounds, roadsides
Slender Rush,	Juncus tenuis,	June, Aug.	Low grounds, fields.
Greene's Rush,	Juncus Greenei,	July,	Sandy borders of salt marshes.
Black Grass,	Juncus bulbosus,	August,	Borders of salt marshes
Grass-leaved Rush,	Juncus marginatus,	July,	Moist, sandy swamps.
Long-fruited Rush,	Juncus Stygius,	– –	Peat swamps.
Three-leaved Rush,	Juncus trifidus,	July,	Mountain summits.

The most prominent and valuable of these plants is the

BLACK GRASS, (*juncus bulbosus*, var. *gerardi*,) an inhabitant of salt marshes. This plant has a simple, slender stem, somewhat flattened, from one to two feet high. It is considered the best product of the salt marshes and grows most luxuriantly along their borders which are only occasionally overflowed by the tides, often working its way to the uplands where the seed is scattered, in large quantities, in curing. It should be cut early, and when well cured is thought to be nearly equal in value to good English hay. Though not of itself equal in value, weight for weight, to "goose grass," (*poa maritima*, p. 49, Fig. 30,) yet the product per acre is so much larger as to make it a more desirable crop.

Most of the salt marsh plants have already been described in the natural history of the true grasses.

The "GOOSE GRASS," one of the most valuable of them, was mentioned under its synonym, Sea Spear Grass, Fig. 30, p. 49,

the name "goose grass," by which it is more generally known along the shores of Essex county and Cape Cod, having been inadvertently omitted. It is generally considered one of the best products of the salt marsh when it grows in mixture with other species of plants, as the black grass, for instance, and deserves a more extended notice.

It is very well known that large tracts of salt marsh are nearly barren. Sometimes close cutting in the early morning, while the dew is on the grass and when it cuts comparatively easy, kills it out, and from that cause the marsh becomes barren. More often, however, excess of water, either upon the surface or in the soil, from the proximity of ponds which have no outlet, causes barrenness. On all such tracts goose grass springs up and dots the whole surface with circular patches of green, which in shape are very like ringworms on the human skin. This grass is seldom found alone except on these barren tracts, and upon them it grows so short and thin as seldom to be worth cutting. One will therefore never see any goose grass hay except mixed with other kinds, and generally with black grass. When these tracts begin to improve, either from draining or from any other cause, other grasses make their appearance, and the goose grass grows much more vigorous and becomes valuable. This will continue to be the case for several years, until the roots of the other grasses have taken entire possession of the soil, when the goose grass disappears almost entirely and bides its time, ready to appear again whenever from any cause its intrusive competitors cease to exist.

The hay made from the mixture of goose and other grasses —among which black grass generally predominates—is a most valuable fodder. The goose grass is so weighty that it takes but a small quantity, comparatively, for a ton, and cattle eat it with almost as much avidity as oats or any other grain. In fact, no hay is more valuable than black grass with a large admixture of goose grass, when properly cured.

The curing process requires care and time, for goose grass is as full of sap as possible, and requires a much longer exposure than black grass, while a very little wet when it is partially cured, materially injures the black grass.

We may judge of the properties of goose grass from the

fact, that in several instances within my own knowledge, cattle have died of hoove from eating it early in the spring.

It resembles in the shape of its leaves, and somewhat in its cluster-like growth, that species of garlic which used formerly to be grown in kitchen gardens called *cives*, or more properly *chives*. Its seed stalks and seeds are almost precisely like the seed stalks and seeds of the common plantain.

It grows both on high and low marshes, but is very seldom worth cutting on those tracts where it grows by itself and without the admixture of other grasses.

It is proper to state in this connection that experiments have been made to introduce this valuable grass into our fresh wet meadows, and with good success.

Most of the superior salt marsh grasses are greatly improved by ditching, while the poorer and comparatively worthless plants found there very soon die out after this operation and give place to more valuable species. It may be safely asserted that, on an average, the value of the marsh is nearly doubled by it, while the vegetable, peaty matter taken from it is sufficient, if properly used, to pay a considerable portion of the outlay.

There is also a small family of plants called the yellow eyed grasses, or the star grasses, consisting of only two species, the first of which is the YELLOW EYED GRASS, (*xyris bulbosa*,) flowering in July, August and September, growing on sandy and peaty soils, and bogs near the coast; and the second, the COMMON YELLOW EYED GRASS, (*xyris caroliniana*,) flowering in August, on sandy swamps. These are beautiful grasses, of no special agricultural value.

There is still another great family of plants which, though of no agricultural value in point of nutritive properties as compared with the true grasses, is, nevertheless, extensively used in New England for forage purposes, and consequently deserves a passing mention. I refer to the sedges, and plants constituting the coarse and innutritious herbage properly included in the term, CAREX, a large and prominent genus of grass-like plants, consisting in all of about four hundred and fifty species known to botanists, extensively diffused over all the damp parts of the globe, and in popular language called grasses. A few species

of carex grow on sandy hills and along the sea shore, but most inhabit marshes, wet meadows, swamps, and the low, wet banks of streams and ditches, and moist woods. Somewhat over a hundred species are found in New England. None of them are of any real agricultural value, though they constitute mainly what we term "meadow hay," or more properly swale hay, in eastern Massachusetts. They are nearly destitute of mealy and saccharine principles in which many of the true grasses abound, and are eaten by cattle only when compelled by hunger, in the want of better grasses. It not unfrequently happens, however, that there is an admixture of the higher grasses among the carices or sedges, such as the fowl meadow, the bastard fowl meadow, the white top or some of the other species possessing higher nutritive qualities, and then, of course, the hay made from the swale is proportionably improved, and may thus become of considerable value for winter fodder.

The Sedges are arranged in the following table:—

TABLE IV. *List of Carices or Sedges, (Cyperaceæ.)*

Common Name.	Systematic Name.	Time of Flowering.	Place of growth.
Diandrus Sedge,	Cyperus diandrus,	Aug., Sept.,	Wet grounds.
Nuttall's Sedge,	Cyperus Nuttallii,	August,	Salt marshes.
Bristle-spiked Galingale,	Cyperus strigosus,	July to Sept.,	Swamps and low lands.
Gray's Galingale,	Cyperus Grayii,	August,	Barren, sandy soils.
Toothed Galingale,	Cyperus dentatus,	August,	Sandy swamps.
Dwarf Odorous Galingale,	Cyperus inflexus,	July to Sept.,	Banks of rivers and brooks.
Schweinitz's Galingale,	Cyperus Schweinitzii,	August,	Shores of lakes.
Common Spike-rush,	Eleocharis palustris,	August,	Swamps and low lands.
Olive-fruited Spike-rush,	Eleocharis olivacea,	August,	Wet, sandy places.
Braked Spike-rush,	Eleocharis rostellata,	– –	Marshes.
Intermediate Spike-rush,	Eleocharis intermedia,	August,	Wet places.
Obtuse-headed Spike-rush,	Eleocharis obtusa,	June. July,	Bogs, borders of muddy ponds and rivers.
Large-tubercled Spike-rush,	Eleocharis tuberculosa,	August,	Sandy swamps.
Hair Club-rush,	Eleocharis acicularis,	June, July,	Muddy borders of ponds
Horsetail Rush,	Eleocharis equisetoides,	– –	Shallow water.
Robbins's Club-rush,	Eleocharis Robbinsii,	July,	Ponds and ditches.
Slender Club-rush,	Eleocharis tenuis,	June, July,	Common in wet places.
Black-fruited Club-rush,	Eleocharis Melanocarpa,	– –	Wet sand.
Dwarf Spike-rush,	Eleocharis pygmæa,	August,	Salt marshes.

TABLE IV.—*Continued.*

Common Name.	Systematic Name.	Time of Flowering.	Place of growth.
Scaly-stalked Club-rush,	Scirpus cæspitosus,	July,	Wet mountains.
Flat-leaved Club-rush,	Scirpus planifolius,	June,	Woods, and in bogs.
Floating Club-rush,	Scirpus subterminalis,	August,	Sluggish streams: rare.
Chair-bottom Rush,	Scirpus pungens,	July, Aug.	Borders of salt marshes and fresh ponds.
Olney's Rush,	Scirpus Olneyi,	July,	Salt marshes.
Torrey's Rush,	Scirpus Torreyi,	July, Aug.	Borders of ponds.
Bulrush,	Scirpus lacustris,	July,	Borders of muddy rivers and ponds.
Weak-stemmed Rush,	Scirpus debilis,	August,	Borders of sandy rivers and lakes.
Sea Bulrush,	Scirpus maritimus,	August,	Salt marshes and salt springs.
River Rush,	Scirpus fluviatilis,	July, Aug.	Borders of lakes and large streams.
Wood Rush,	Scirpus sylvaticus,	July,	Wet meadows.
Cluster-head Rush,	Scirpus polyphyllus,	July,	Swamps, shady borders of ponds.
Porter's Rush,	Scirpus lineatus,	July,	Bogs in western Mass.
Wool Grass,	Scirpus Eriophorum,	July to Sept.	Wet meadows, swamps.
Cotton Grass,	Eriophorum Alpinum,	May, June,	Peat swamps.
Harestail,	Eriophorum vaginatum,	June,	Mossy swamps and high mountains.
Rusty Cotton Grass,	Eriophorum Virginicum,	July, Aug.	Common in swamps.
Broad-leaved Cotton Grass,	Eriophorum polystachyon,	June, July,	Boggy meadows.
Narrow-leaved Cotton Grass,	Eriophorum gracile,	June to Aug.	Wet mossy swamps.
Tall Fimbristylis,	Fimbristylis spadicea,	July to Sept.	Salt marshes: rare.
Tufted Fimbristylis,	Fimbristylis autumnalis,	Aug. to Oct.	Low grounds.
Hair-like Fimbristylis,	Fimbristylis capillaris,	Aug., Sept.	Common on sandy fields.
Umbrella Grass,	Fuirena squarrosa,	August,	Sandy, wet places.
Bald Rush,	Psilocarya scirpoides,	July,	Inundated swamps.
Horned Rush,	Ceratoschœnus macrostachya	– –	Borders of ponds: rare.
Dwarf Hemicarpha,	Hemicarpha subsquarrosa,	July,	Sandy borders of rivers and lakes.
White Beak-rush,	Rhynchospora alba,	July, Aug.	Mossy swamps, common.
Small Beak-rush,	Rhynchospora capillacea,	July,	Swamps and marshes.
Brown Beak-rush,	Rhynchospora fusca,	July,	Low wet grounds: rare.
Tall, Slender Beak-rush,	Rhynchospora gracilenta,	– –	Low grounds.
Common Beak-rush,	Rhynchospora glomerata,	July, Aug.	Boggy grounds.
Round-head Beak-rush,	Rhynchospora cephalantha,	August,	Sandy swamps.
Smooth Twig-rush,	Cladium mariscoides,	July,	Borders of ponds, bog meadows.
Sessile-spiked Nut-rush,	Scleria reticularis,	August,	Sandy swamps and borders of ponds.
Loose-flowered Nut-rush,	Scleria laxa,	August,	Sandy swamps.
Three-clustered Nut-rush, or Whip-grass,	Scleria triglomerata,	July,	Swamps and moist thickets.
Few-flowered Nut-rush,	Scleria pauciflora,	July,	Swamps and hills.

TABLE IV.—*Continued.*

Common Name.	Systematic Name.	Time of Flowering.	Place of growth.
Dwarf Verticillate Nut-rush,	Scleria verticillata,	June,	Swamps.
Slender Sedge,	Carex exilis,	June, July,	Marshes in Danvers.
Few-flowered Sedge,	Carex pauciflora,	– –	Peat swamps.
Bristle-stalked Sedge,	Carex polytrichoides,	May,	Low grounds & woods.
Willdenow's Sedge,	Carex Willdenovii,	May,	Moist, shady places.
Back's Sedge,	Carex Backii,	– –	Mount Tom and rocky hills.
Two-seeded Sedge,	Carex disperma,	June,	Mossy swamps and mountains.
Long-rooted Sedge,	Carex cherelorhiga,	May,	Mossy swamps.
Oval-headed Sedge,	Carex cephalophora,	May,	Hill-sides and fields
Muhlenberg's Sedge,	Carex Muhlenbergii,	April,	Rocky hill-sides and mountains.
Dry-spiked Sedge,	Carex siccata,	– –	Sandy plains.
Rose Sedge,	Carex rosea,	May,	Moist woods and low grounds.
Retroflexed Sedge,	Carex retroflexa,	May,	Open woods and moist meadows.
Bur-reed Sedge,	Carex sparganioides,	May,	Low swampy grounds.
Awl-fruited Sedge,	Carex stipata,	April,	Swamps, low grounds.
Fox Sedge,	Carex vulpinoidea,	May,	Low grounds: common
Bristly-spiked Sedge,	Carex setacea,	June,	Wet meadows.
Bromus-like Sedge,	Carex bromoides,	May,	Wet swamps.
Foxtail Sedge,	Carex alopecoidea,	– –	Woods.
Sartwell's Sedge,	Carex Sartwellii,	– –	– –
Lesser-panicled Sedge,	Carex teretiuscula,	June,	Swamps: common.
Large-panicled Sedge,	Carex decomposita,	– –	Swamps.
Three-seeded Sedge,	Carex trisperma,	June,	Peat swamps, wet mountain woods.
Dewey's Sedge,	Carex Deweyana,	June,	Moist woods.
White Carex,	Carex canescens,	May,	Wet meadows.
Little Prickly Sedge,	Carex stellulata,	May,	Wet meadows.
Slender Cluster-spiked Sedge,	Carex tenuiflora,	June,	Mossy swamps.
Broom-like Sedge,	Carex scoparia,	– –	Wet meadows and swamps.
Straw-colored Sedge,	Carex straminea,	May, June,	Borders of woods and fields.
Long-stalked Sedge,	Carex pedunculata,	April,	Rocky hills and dry woods.
Square-headed Sedge,	Carex squarrosa,	May,	Low meadows, thickets
Buxbaum's Sedge,	Carex Buxbaumii,	May,	Mossy swamps.
Three-headed pubescent Sedge	Carex triceps,	May,	Woods and meadows.
Green-spiked pubescent Sedge	Carex virescens,	May,	Woods and hill-sides.
Slender Nodding Sedge,	Carex gracillima,	June,	Moist grounds.
Showy Sedge,	Carex formosa,	May,	Wet meadows.
Davis's Sedge,	Carex Davisii,	May,	Swamps, river banks.
Rigid Sedge,	Carex rigida,	July,	Mountain summits.

TABLE IV.—*Continued.*

Common Name.	Systematic Name.	Time of Flowering.	Place of growth.
Large Bog Sedge,	Carex augustata,	May,	Swamps: common.
Smaller Bog Sedge,	Carex cæspitosa,	May,	Swamps and banks of streams.
Water Sedge,	Carex aquatilis,	June, July,	Borders of lakes and rivers.
Golden-fruited Sedge,	Carex aurea,	May, June,	Borders of swamps and brooks.
Fringed Sedge,	Carex crinita,	May, June,	Swamps, river banks.
Few-fruited Sedge,	Carex oligosperma,	June,	Mountains, borders of swamps.
Inflated Sedge,	Carex bullata,	May,	Swamps: not common.
Cylindrical-spiked Sedge,	Carex cylindrica,	– –	Swamps: common.
Bladder-fruited Sedge,	Carex utriculata,	May,	Wet swamps.
Awl-fruited Sedge,	Carex subulata,	May,	Cedar swamps.
Tall Yellow Sedge,	Carex folliculata,	June,	Swamps, peat bogs.
Swollen-fruited Sedge,	Carex intumescens,	June,	Wet grounds and open woods.
Hop Sedge,	Carex lupulina,	June,	Swamps and borders of ponds.
Rough-fruited Sedge,	Carex scabrata,	May,	Borders of brooks.
Schweitnitz's Sedge,	Carex Schweinitzii,	May,	Swamps.
Late-fruited Sedge,	Carex retrorsa,	May,	Borders of ponds and streams.
Long-pointed Sedge,	Carex tentaculata,	May,	Swamps.
Porcupine Sedge,	Carex hystricina,	June,	Swamps: common.
Cyperus-like Sedge,	Carex Pseudo-Cyperus,	June,	Swamps and sluggish streams.
Long-beaked Sedge,	Carex longirostris,	June,	Shady, rocky places.
Hairy-fruited Sedge,	Carex trichocarpa,	June,	Marshes and lakes.
Awned Sedge,	Carex aristata,	– –	Lake shores.
Umbel-spiked Sedge,	Carex umbellata,	May,	Rocky hill-sides.
Pennsylvanian Sedge,	Carex Pennsylvanica,	April,	Dry woods and hill-sides
New England Sedge,	Carex Novæ-Angliæ,	June,	Woody hills and mountains.
Slender-leaved Sedge,	Carex filiformis,	May,	Peat swamps.
Woolly-fruited Sedge,	Carex lanuginosa,	May,	Swamps and borders of ponds.
Short Woolly-spiked Sedge,	Carex vestita,	May,	Moist, sandy soils.
Pubescent Sedge,	Carex pubescens,	May,	Woods and swamps.
Mud Sedge,	Carex limosa,	June,	Mossy swamps.
Livid Sedge,	Carex livida,	June,	Mossy swamps.
Large Yellow Carex,	Carex flava,	May,	Swamps.
Œder's Sedge,	Carex Œderi,	May,	Wet limestone rocks.
Pale Pubescent Sedge,	Carex pallescens,	May,	Swamps.
Torrey's Sedge,	Carex Torreyi,	– –	Northward.
Striated Sedge,	Carex striata,	May,	Swamps.
Granular-spiked Sedge,	Carex granularis,	May,	Wet swamps: common.
Loose-flowered Sedge,	Carex laxiflora,	May,	Swamps & moist woods.

TABLE IV.—*Continued.*

Common Name.	Systematic Name.	Time of Flowering.	Place of growth.
Conical-fruited Sedge,	Carex conoidea,	May,	Wet swamps.
Slender Wood Sedge,	Carex digitalis,	May,	Woods and hill-sides.
Hitchcock's Sedge,	Carex Hitchcockiana,	May,	Woods, hill-sides.
Small Few-fruited Sedge,	Carex oligocarpa,	May,	Woods.
Crooked-necked Sedge,	Carex tetanica,	May,	Margin of lakes and rivers.
Two-edged Sedge,	Carex anceps,	May,	Woods.
Pale, Smooth Sedge,	Carex blanda,	May,	Swamps and dry open woods.
Crawe's Sedge,	Carex Crawei,	– –	Banks of rivers.
Plantain-leaved Sedge,	Carex plantaginea,	April, May,	Shady, rocky ravines.
Carey's Sedge,	Carex Careyana,	May,	Shady, dry woods.
Bristled-leaved White Sedge,	Carex eburnea,	May,	Limestone hills.
Fringed Sedge,	Carex flexilis,	June,	Moist, shady places.
Short-beaked Woody Sedge,	Carex arctata,	May,	Moist woods, swamps.
Weak Sedge,	Carex debilis,	May,	Moist woods, swamps.
Millet-like Sedge,	Carex miliacea,	May,	Wet swamps.
Lake Sedge,	Carex lucustris,	June,	Deep swamps, borders of lakes.
Tuckerman's Sedge,	Carex Tuckermani,	– –	Wet swamps.
Washington's Sedge,	Carex Washingtoniana,	– –	Near summit of Mount Washington.
Gray's Sedge,	Carex Grayii,	July,	Swamps and river borders.
Bog Sedge,	Carex acuta,	– –	In dense bogs in swamps
Sea Carex,	Carex arenaria,	June, July,	Sandy sea shores.

This table includes all the species of carex known and described as inhabitants of our low lands, and is thought to be very complete. As already intimated, none of these coarse sedges are rich in nutritive elements, and none are worthy of cultivation. The farmer's care should be to eradicate them and supply their places with the higher and more nutritious grasses. This may be done by thorough draining, an operation which lies at the foundation of all successful management of low lands, and without which they are comparatively worthless, while, if properly reclaimed, they are among the best and most productive lands on the farm.

The roots of the sedges are perennial, and for the most part creeping, a few being tufted and fibrous. The stems are simple and free from joints or nodes. The leaves are linear, flat, pointed, roughish on the surface and sharp on the edges.

The grasses whose natural history has been stated in the preceding pages, might be separated into four or five distinct groups, which would facilitate the study of them; for it must have been observed that many of them possess marked peculiarities of growth.

I. We find first the bush or jungle grasses, or such as are not inclined to grow with other species, and form a close, matted turf or sward. Of these we have as examples the

Tufted Hair Grass, (*aira cæspitosa.*)
Meadow Oat Grass, (*avena pratensis.*)
Tall Fescue Grass, (*festuca elatior.*)

A few others, if sown alone, will assume somewhat the same form, in tufts or cushions, as

Sheep's Fescue, (*festuca ovina.*)
Hard Fescue, (*festuca duriuscula.*)
Orchard Grass, (*dactylis glomerata.*)

This peculiarity in the growth of the last three grasses is prevented by close pasturing, rolling and proper cultivation. These operations improve upon nature, since if left to themselves they would far more certainly assume the jungle growth, such as is often seen on poor, thin pasture soils, especially in the south-eastern parts of the State, where on the sandy soils this mode of growth is every where observable—a close, fine, matted sward being attained only by careful cultivation.

II. The aquatic or water grasses form another distinct group, and among these are the

Reed Canary Grass, (*phalaris arundinacea,*)
Common Reed Grass, (*arundo phragmites.*)
Water Spear Grass, (*poa aquatica.*)
Common Manna Grass, (*poa fluitans.*)
Rice Grass, (*Leersia oryzoides.*)
Floating Foxtail, (*alopecurus geniculatus.*)
Wild Rice, (*zizania aquatica.*)

These grasses grow mostly in water and are not cultivated with us as agricultural grasses with the exception, perhaps, of

the first. Wild rice grass is sometimes cultivated and yields large crops at the South, and floating foxtail in Europe.

III. Marsh or Salt Grasses, among which we have
Salt Reed Grass, (*spartina polystachya.*)
Rush Salt Grass, (*spartina juncea.*)
Salt Marsh Grass, (*spartina stricta.*)
Black Grass, (*juncus bulbosus.*)
Beach Grass, (*ammophila arundinacea.*)
Goose Grass, (*poa maritima.*)

IV. Field or Pasture Grasses. Under this head may be included a very large number of species, all of which have been described above. These grasses might be subdivided according to the soils and situations which they naturally affect; for though a grass may sometimes be found or placed in a soil which is not naturally fitted for it, yet no species will arrive at its most perfect development on a soil not well adapted to it.

Among these might be mentioned as examples
Timothy, (*phleum pratense.*)
Meadow Foxtail, (*alopecurus pratensis.*)
Common Spear Grass, (*poa pratensis.*)
Orchard Grass, (*dactylis glomerata.*)
Perennial Rye Grass, (*lolium perenne.*)
Italian Rye Grass, (*lolium italicum.*)
Redtop, (*agrostis vulgaris.*)
Whitetop, (*agrostis alba.*)
Downy Oat Grass, (*avena pubescens.*)
Meadow Soft Grass, (*holcus lanatus.*)
Meadow Fescue, (*festuca pratensis.*)
Field Barley Grass, (*hordeum pratense.*)
Tall Oat Grass, (*arrhenatherum avenaceum.*)

V. Annual Weeds, which, though proper grasses, are often very troublesome in cultivated grounds, either on account of their creeping, underground stems, or their rapid and luxuriant growth. Thrifty farming is a ceaseless struggle against these pests, and the farmer is generally careful to keep as clear as possible of them. Among these may be named

Willard's Bromus, (*bromus secalinus.*)
Soft Brome Grass, (*bromus mollis.*)
Slender Foxtail, (*alopecurus agrestis.*)
Creeping Bent Grass, (*agrostis stolonifera.*)
Couch, or Twitch Grass, (*triticum repens.*)
Rough Stalked Meadow Grass, (*poa trivialis.*)
Annual Meadow Grass, (*poa annua.*)
Blue, or Wire Grass, (*poa compressa.*)

Of these, the last four are not always considered as weeds, since they are sometimes sown as pasture grasses; but when they appear in cultivated grounds, in gravel walks and avenues, they are exceedingly troublesome and difficult to eradicate.

Each of the groups indicated above may be considerably enlarged by a study of the natural history of the grasses presented in the foregoing pages.

Many of the grasses which have been described, possess but little value for the purposes of cultivation, it is true, but it should not be forgotten that they all have their uses, and these uses in the grand economy of nature are exceedingly important, however they may appear to our short sighted vision. No plant comes up to the sunlight or expands its beautiful leaves, that does not derive its support in part from the atmosphere, and even though its life be short, it adds materially in its decay to the vast mass of vegetable mould which covers the surface of the globe and forms the richness of the soil. This surface mould has been accumulating for ages in many localities; every plant that grew in ages past bringing down to us in a tangible form the riches with which the air that surrounded it was stored, which now lie waiting the farmers' use in meadows of exhaustless fertility, in swamps and bogs of vast, increasing utility in our agriculture, and in beds of peat, the value of which we have scarcely begun to appreciate. Thus, the grasses which are not cultivated for their direct nutritive qualities, are not without their value, and they deserve our careful study and attention.

NUTRITIVE VALUE OF THE GRASSES.

We have seen that the various species of grass differ very materially in nutritive value; that some contain the greatest quantity of nutritive matter when green or in the flower; others when the seed is ripe and the plant mature; that some yield a luxuriant aftermath, while others can scarcely be said to produce any at all; that some flourish in elevated situations and are best suited to the grazing of sheep, while others grow most luxuriantly on the low lands and in the marshes, and sustain the richest dairies; and that no soil is so sterile, no plain so barren but that a grass can be found adapted to it. Some varieties, indeed, will not endure a soil even of medium fertility, nor the application of any stimulating manure, but cling with astonishing tenacity to the drifting sands, while others prefer the heaviest clays or revel in the hot beds of ammonia; some are gregarious in their habits, requiring to be sown with other species, and if sown alone will linger along till the wild grasses spring up to their support; others are solitary, and if mixed with different species will either extirpate them, usurping to themselves the entire soil, or die and disappear. Nearly every species is distinguished for some peculiar quality, and most are deficient in some, comparatively few combining all the qualities desired by us in alternate field crops, for pastures or permanent mowing, to such an extent as to justify a general cultivation.

It is important, therefore, to learn the comparative nutritive value of each species thought to be worth cultivating.

This study is naturally attended with great difficulties. It is but recently that accurate researches have been made with a view of arriving at such positive results as would be entitled to full confidence.*

It is now very well established that the nutritive value of the food of an animal depends chiefly upon the proportion of nitrogenous substances contained in it. Without doubt, the sugar

* In 1824, a very laudable attempt was made in England by the Duke of Bedford, at Woburn Abbey, to ascertain the comparative value of most of the grasses which could then be obtained, and the results of the experiments,

which is found to be an ingredient of most vegetable substances at some periods of their growth, in some degree contributes to it also. The nitrogenous constituents of any substance, as grass or hay, for instance, may be determined with little difficulty and with great exactness, since it has been found by abundant research, that, when present, they are of nearly the same constitution, and do not vary in their combinations. The determination of the sugar is somewhat more difficult.

The constituents of plants may be divided into two classes, one class embracing all those substances of which nitrogen or azote forms a part, and the other consisting of non-nitrogenous bodies. Gluten, albumen, gelatine, casein, legumen and fibrin, belong to the former class, being nitrogenous substances, while starch, gum, sugar, woody fibre, mucilage, &c., are destitute of nitrogen, or non-nitrogenous.

Only a small quantity of nitrogen is found in vegetable substances, and it is derived, in part, at least, from the atmosphere in the form of ammonia. On the other hand, nitrogenous substances form a large proportion of the constituents of the blood of animals and appear in their whole system. As there is a constant waste in the animal and a continual formation of new tissues,—as the whole body is constantly renewed through the agency of the blood which is converted into flesh and muscle,—there must be a never failing supply of nourishment, and this nourishment for the higher animals is found, as already intimated, in the nitrogenous elements of plants.

conducted by his gardener, George Sinclair, were detailed in a volume under the title of "*Hortus Gramineus Woburnensis.*" This work, which was the first treatise worthy of mention on this subject, became the text-book on the grasses, and has been followed by most subsequent writers, down to the present time. But these experiments must be regarded as very unsatisfactory, both on account of the imperfections of the methods of arriving at the results, (though they were the best then known, and suggested by Sir Humphrey Davy,) and because each species or variety was cultivated only to a very limited extent. The produce per acre, for instance, was calculated, in most cases, from the yield of four square feet. Besides this, very great discrepancies occur in the volume which can with difficulty be accounted for.

The analyses recently made by Prof. Way, the distinguished chemist of the Royal Agricultural Society, are more reliable, in my estimation, than any which can be found, and no treatise on the grasses would be complete without giving the valuable results to which he has arrived.

For every ounce of nitrogen which the animal requires to sustain life and health, he must take into the stomach, in the shape of food, such a quantity of vegetable substances as will furnish him with an ounce of nitrogen. If we suppose one kind of hay to contain one ounce of nitrogen to the pound, and another to have only half as much, or only an ounce in two pounds, the pound which contains the ounce of nitrogen would go as far to nourish the animal—other things being equal—as the two pounds which contain only the same quantity of nitrogen. The importance of woody fibre to act mechanically in giving bulk to the food, is not, of course, to be overlooked.

Nor is this a mere deduction of theory. The experiment has frequently been made, and it is now fully established both by science and experience, that the greater the proportion of nitrogen which any vegetable contains, the smaller will be the quantity of that vegetable required to nourish the animal body, and the less nitrogen any vegetable contains, the greater will be the quantity of it required. Muscle and flesh are composed of nitrogenous principles, while fat is made up of non-nitrogenous matter. Every keeper of stock knows that to feed an animal on oil cake alone, for instance, which is but slightly nitrogenous, might fatten him, but it would not give him strength of muscle or size; while if the same animal be kept on the cereal grains, as wheat or Indian corn, alone, his size rapidly increases, his muscular system develops, and he gains flesh without increasing his fat in proportion. It was with reference to these facts that Boussingault formed his tables of nutritive equivalents, and they agree very closely with the results of practical observation.

The non-nitrogenous substances are necessary for the production of fat and to supply the animal body with heat, and thus they meet a want in the animal economy, although they do not contribute so directly to nourish and sustain the system. They are, therefore, important in the analyses of articles of food, though not so essential in determining merely their nutritive values.

From what has been said, the reader will very readily understand the following tables containing the results of the investigations of Prof. Way. The specimens of the various grasses on which his researches were made, were analyzed both

in their green state as taken from the field, and after being dried at a temperature of 212° Fahr., a point at which the moisture is found to be entirely expelled and evaporation ceases, and the importance of both determinations must be obvious on a moment's reflection.

The names of the natural grasses and the dates of their collection are arranged in the following table:—

TABLE V. *Natural Grasses. Name, and Date of Collection.*

Common Name.	Botanic Name.	Date of collection.	Character of the Soil.
Sweet-scented Vernal Grass,	Anthoxanthum odoratum,	May 25,	Calcareous loam.
Meadow Foxtail Grass,	Alopecurus pratensis,	June 1,	Calcareous loam, gravelly subsoil.
Tall Oat Grass,	Arrhenatherum avenaceum,	July 17,	Forest marble loam.
Yellow Oat Grass,	Avena flavescens,	June 29,	Forest marble loam.
Downy Oat Grass,	Trisetum pubescens,	July 11,	Dry calcareous loam.
Common Quaking Grass,	Briza media,	June 29,	Forest marble.
Upright Brome Grass,	Bromus erectus,	June 23,	Calcareous loam.
Soft Brome Grass,	Bromus mollis,	May 8,	Stiff loam.
Crested Dog's-tail Grass,	Cynosurus cristatus,	June 21,	Calcareous loam.
Orchard Grass,	Dactylis glomerata,	June 13,	Calcareous loam on gravel.
Orchard Grass, seeds ripe,	Dactylis glomerata,	July 19,	Calcareous loam.
Hard Fescue Grass,	Festuca duriuscula,	June 13,	Dry calcareous loam.
Meadow Soft Grass,	Holcus lanatus,	June 29,	Calcareous loam.
Barley Grass,	Hordeum pratense,	July 11,	Calcareous loam on gravel.
Perennial Rye Grass,	Lolium perenne,	June 8,	Calcareous rubbly loam
Italian Rye Grass,	Lolium italicum,	June 13,	Forest marble loam.
Timothy,	Phleum pratense,	June 13,	Forest marble loam.
Annual Spear Grass,	Poa annua,	May 28,	Loam, with gravelly subsoil.
June Grass,	Poa pratensis,	June 11,	Dry calcareous loam.
Rough-stalked Meadow Grass,	Poa trivialis,	June 18,	Calcareous loam.
Grass from a watered or irrigated meadow,	First Crop,	April 30,	Calcareous loam.
Grass from a watered or irrigated meadow,	Second Crop,	June 26,	Calcareous loam.
Annual Rye Grass,	– – –	June 8,	Calcareous rubbly loam

In the same manner, the name and date of collection of each specimen of artificial grass, analyzed, are arranged in table VI.

TABLE VI. *Artificial Grasses. Name, and Date of Collection.*

Common Name.	Botanic Name.	Date of collection.	Character of Soil.
Red Clover,	Trifolium pratense,	June 7,	Tenacious loam.
Perennial Clover,	Trifolium perenne,	June 4,	Calcareous loam.
Crimson Clover,	Trifolium incarnatum,	June 4,	Calcareous loam.
Cow Grass,	Trifolium medium,	June 7,	Tenacious loam.
Cow Grass, 2d lot,	Trifolium medium,	June 21,	Calcareous loam.
Hop trefoil,	Trifolium procumbens,	June 13,	Calcareous loam.
White Clover,	Trifolium repens,	June 18,	Forest loam.
Common vetch,	Vicia sativa,	June 13,	Forest loam.
Sainfoin,	Onobrychis sativa,	June 8,	Dry loam.
Lucerne, or Alfalfa,	Medicago sativa,	June 16,	– –
Black Medick, or Nonsuch,	Medicago lupulina,	June 6,	Calcareous loam.

The inquiries of Prof. Way were directed to ascertain

1. The proportion of water in each grass as taken from the field.

2. The proportion of albuminous or flesh-forming substances, including, without distinction, all the nitrogenous principles.

3. The proportion of oily or fatty matters which may be called *fat-forming principles.*

4. The proportion of elements of respiration, or heat producing principles, among which are included starch, gum, sugar, pectic acid, &c.; all the non-nitrogenous substances indeed, except fatty matters and woody fibre.

5. The proportion of woody fibre.

6. The amount of mineral matter or ash.

The specimens were picked out, plant by plant, each specimen by itself, from fields in which they were growing naturally, or mixed in the ordinary mode of cultivation, and were not raised expressly for analysis.

These tables of analyses, containing as they do the results of profound investigation, and forming as they do one of the most important contributions recently made to the science of agriculture, are worthy of careful study and will be found to be full of the most valuable practical suggestions.

The results of the analysis of the natural grasses in the green state, are arranged in table VII. as follows:—

TABLE VII. *Analysis of Natural Grasses.* (100 *parts as taken green from the field.*)

Name of Grass.	Water.	Albuminous, or flesh-forming principles.	Fatty Matters.	Heat-producing principles—starch, gum, sugar, etc.	Woody Fibre.	Mineral matter, or ash.
Sweet-scented Vernal,	80.35	2.05	.67	8.54	7.15	1.24
Meadow Foxtail,	80.20	2.44	.52	8.59	6.70	1.55
Tall Oat Grass,	72.65	3.54	.87	11.21	9.37	2.36
Yellow Oat Grass,	60.40	2.93	1.04	18.66	14.22	2.72
Downy Oat Grass,	61.50	3.07	.92	19.16	13.34	2.01
Quaking Grass,	51.85	2.93	1.45	22.60	17.00	4.17
Upright Brome Grass,	59.57	3.78	1.35	33·19		2.11
Soft Brome Grass,	76.62	4.05	.47	9.04	8.46	1.36
Crested Dog's-tail,	62.73	4.13	1.32	19.64	9.80	2.38
Orchard Grass,	70.00	4.06	.94	13.30	10.11	1.59
Orchard Grass, seeds ripe,	52.57	10.93	.74	12.61	20.54	2.61
Hard Fescue Grass,	69.33	3.70	1.02	12.46	11.83	1.66
Meadow Soft Grass,	69.70	3.49	1.02	11.92	11.94	1.93
Barley Grass,	58.85	4.59	.94	20.05	13.03	2.54
Perennial Rye Grass,	71.43	3.37	.91	12.08	10.06	2.15
Italian Rye Grass,	75.61	2.45	.80	14.11	4.82	2.21
Timothy Grass,	57.21	4.86	1.50	22.85	11.32	2.26
Annual Spear Grass,	79.14	2.47	.71	10.79	6.30	.59
June Grass,	67.14	3.41	.86	14.15	12.49	1.95
Rough-stalked Meadow Grass,	73.60	2.58	.97	10.54	10.11	2.20
Grass from Irrigated Meadow,	87.58	3.22	.81	3.98	3.13	1.28
Grass from Irrigated Meadow, 2d crop,	74.53	2.78	.52	11.17	8.76	2.24
Annual Rye Grass,	69.00	2.96	.69	12.89	12.47	1.99

A glance at the first column of table VII. will show a striking difference in the percentage of water, it being as high as 80 in some instances, while it falls as low as 60, and in one instance to 51, without considering the second specimen of orchard grass—in which the seed was allowed to ripen, when, of course, the amount of water would be much less than at the period of flowering—or the irrigated grasses.

It will be noticed that those grasses which come earliest into flower are generally the most succulent, though this is not uniformly the case.

It will be seen that the sweet-scented vernal grass and the meadow foxtail contain but 20 parts in 100, of dry, solid matter, while the yellow oat and the downy oat grasses contain nearly double, or about 40 per cent. This difference, though of no great importance in itself, is of some interest in showing that to judge of the quantity of hay a given burden of grass will produce, it is necessary to consider the species of grass which mainly composes the meadow, since it is evident that a given weight of one variety might make double the quantity of the same weight of another.

But the chief interest of the table is to be found in columns three, four and five. The albuminous or flesh forming principles will be found to be double in some instances what they are in others; and in accordance with the principles laid down in the explanatory remarks which precede the tables, some would appear to be more than twice as nutritive as others, but it should be borne in mind that these differences depend in part on the variations in the quantity of water, and that the real differences will appear more apparent in the dried specimens.

A glance at table VIII. will show that the percentage of water in the artificial grasses as taken from the field, is greater than that of the natural grasses under the same circumstances. The percentage of albuminous or flesh forming principles is generally, though by no means uniformly, less than that of our best grasses. Compare red clover, for instance, with Timothy, and the first striking peculiarity is the difference in the amount of water, in the one case exceeding 81 per cent., leaving but 19 per cent. of solid matter from which the flesh forming and other nutritive substances must be drawn, while in Timothy the water amounts to only little over 57 per cent., leaving 43 per cent. of solid substances containing nutritive principles. This is an important difference to begin with. The percentage of flesh forming principles of the two plants does not, at first sight, appear to differ very materially, the clover containing 4.27 the Timothy 4.86; but a little consideration of the exceeding value of this constituent, will show that the latter has an important advantage in this respect over the clover. In fat-forming principles, the Timothy is more than twice as rich as clover, while in heat-producing principles—also very valuable—Timothy far surpasses clover, the one producing 22.85 per cent.,

and the other only 8.45 per cent. Of waste and useless matter in the shape of woody fibre, Timothy contains the largest per cent., while the larger quantity of mineral matter shows it also to be a greater exhauster of the soil. The most valuable practical deductions of a similar nature may be made by comparing these tables.

TABLE VIII. *Analysis of Artificial Grasses.* (100 *parts, as taken from the field*).

Name of Plant.	Water.	Albuminous, or flesh-forming principles.	Fatty Matters.	Heat-producing principles—starch, gum, sugar, etc.	Woody fibre.	Mineral matter, or ash.
Red Clover,	81.01	4.27	.69	8.45	3.76	1.82
Perennial Clover,	81.05	3.64	.78	8.04	4.91	1.58
Crimson Clover,	82.14	2.96	.67	6.70	5.78	1.75
Cow Grass,	74.10	6.30	.92	9.42	6.25	3.01
Cow Grass, 2d specimen,	77.57	4.22	1.07	11.14	4.23	1.77
Hop Trefoil,	83.48	3.39	.77	7.25	3.74	1.37
White Clover,	79.71	3.80	.89	8.14	5.38	2.08
Common Vetch,	82.90	4.04	.52	6.75	4.68	1.11
Sainfoin,	76.64	4.32	.70	10.73	5.77	1.84
Lucerne, or Alfalfa,	69.95	3.83	.82	13.62	8.74	3.04
Black Medick, or Nonsuch,	76.80	5.70	.94	7.73	6.32	2.51

It will be seen in table IX. that in the case of orchard grass and the irrigated meadow, the seeds were ripened, and they should not, therefore, be compared with other grasses taken in the blossom, without considering this fact. It will be seen, too, that the specimens analyzed were in the dry state, much drier than they could be made by the ordinary process of hay making; for however perfectly the hay is cured it will still contain a very considerable percentage of water, and if artificially dried, as in the trials given above, and then exposed to the air, it will absorb from 10 to 15 per cent. of water, showing that no hay is absolutely dry by any ordinary processes. In England, the percentage of water in well made hay is about 16, and hay artificially dried will absorb that amount if exposed again to the air. I do not think the percentage here would be so large, for obvious reasons. In the analysis of the hay of the reed canary grass,

made by Prof. Horsford and given on a preceding page, the percentage was but 10.24. That was a well-cured specimen, taken after it had passed the period of blossoming, and the amount of water is, perhaps, slightly below the average.

TABLE IX. *Analysis of Natural Grasses.* (100 *parts of the grass dried at* 212° *Fahr.*)

Name of Grass.	Albuminous, or flesh-forming principles.	Fatty Matters.	Heat-producing principles—starch, sugar, gum.	Woody Fibre.	Mineral Matter, or ash.
Sweet-scented Vernal Grass,	10.43	3.41	43.48	36.36	6.32
Meadow Foxtail,	12.32	2.92	43.12	33.83	7.81
Tall Oat Grass,	12.95	3.19	38.03	34.24	11.59
Yellow Oat Grass,	7.48	2.61	47.08	35.95	6.88
Downy Oat Grass,	7.97	2.39	49.78	34.64	5.22
Quaking Grass,	6.08	3.01	46.95	35.30	8.66
Upright Brome Grass,	9.44	3.33	82·02		5.21
Soft Brome Grass,	17.29	2.11	38.66	36.12	5.82
Crested Dog's-tail,	11.08	3.54	52.64	26.36	6.38
Orchard Grass,	13.53	3.14	44.32	33.70	5.31
Orchard Grass, seeds ripe,	23.08	1.56	26.53	43.32	5.51
Hard Fescue Grass,	12.10	3.34	40.43	38.71	5.42
Meadow Soft Grass,	11.52	3.56	39.25	39.30	6.37
Meadow Barley Grass,	11.17	2.30	46.68	31.67	6.18
Perennial Rye Grass,	11,85	3.17	42.24	35.20	7.54
Italian Rye Grass,	10.10	3.27	57.82	19.76	9.05
Timothy,	11.36	3.55	53.35	26.46	5.28
Annual Spear Grass,	11.83	3.42	51.70	30.22	2.83
June Grass,	10.35	2.63	43.06	38.02	5.94
Rough-stalked Meadow Grass,	9.80	3.67	40.17	38.03	8.33
Grass from irrigated meadow,	25.91	6.53	32.05	25.14	10.37
Grass from irrigated meadow, 2d crop,	10.92	2.06	43.90	34.30	8.82

It will be seen that a great difference exists in the valuable constituents of the grasses analyzed in this table, ranging as follows:—

	Lowest.	Highest.	Average.
Flesh-forming principles,	6.08	17.29	11.68
Fat-producing principles,	2.11	3.67	2.89
Heat-giving principles,	38.03	57.82	47.92

TABLE X. *Analysis of Artificial Grasses.* (*In* 100 *parts of the grass dried at* 212° *Fahr.*)

Name of Plant.	Albuminous, or flesh-forming principles.	Fatty Matters.	Heat-producing principles—starch, sugar, gum, etc.	Woody fibre.	Mineral matter, or ash.
Red Clover,	22.55	3.67	44.47	19.75	9.56
Perennial Clover,	19.18	4.09	42.42	25.96	8.35
Crimson Clover,	16.60	3.73	37.50	32.39	9.78
Cow Grass,	24.33	3.57	36.36	24.14	11.60
Cow Grass, 2d specimen,	18.77	4.77	49.65	18.84	7.97
Hop Trefoil,	20.48	4.67	43.86	22.66	8.33
White Clover,	18.76	4.38	40.04	26.53	10.29
Common Vetch,	23.61	3.06	39.45	27.38	6.50
Sainfoin,	18.45	3.01	45.96	24.71	7.87
Lucerne, or Alfalfa,	12.76	2.76	40.16	34.21	10.11
Black Medick,	24.60	4.06	33.31	27.19	10.84

A glance at this table will show that the different principles in the artificial grasses vary to a great extent, as follows:—

	Lowest.	Highest.	Average.
Flesh-forming principles,	12.76	24.60	18.68
Fat-producing principles,	2.76	4.77	3.76
Heat-giving principles,	33.31	49.65	41.48

The difference in composition exhibited in the natural grasses of table IX. are very marked, and of course, the value of the grasses as compared with each other must vary greatly. Still, the practical value of a grass depends somewhat upon circumstances which cannot be analyzed, such as the period at which it arrives at maturity, and the particular soil and location of the farmer. It might happen that a grass not in itself so rich in nutritive qualities as another, would be preferred on account of its coming to maturity just at the time when the farmer most needed it. But the particular value of this table is, that it shows the comparative nutritive qualities of the grasses, since all the specimens were collected and investigated in the same manner, at the same period of growth,—or as nearly as possible,—when in the flower, so that whatever sources of error

might exist to modify the results, they would naturally apply to all alike.

The grasses from the irrigated meadow consisted principally of June, or Kentucky blue grass, rough stalked meadow grass, perennial rye grass, meadow soft grass, barley grass, meadow oat grass and a few other species, and it will be noticed that in combination they abound in flesh and fat-forming principles to a greater extent than we should be led to suppose from the composition of any one of them alone.

Our favorite Timothy compares very favorably with the other grasses, containing a less percentage of useless matter as woody fibre, than any other, except Italian rye grass and crested dog's-tail, a grass not common with us, and the irrigated grasses. In point of soluble, heat-producing principles, sugar, gum and starch, it is surpassed by the Italian rye grass, but by no others. The analyses of this grass in its green and dry states in tables VII. and IX., fully justify the preference which we have long shown for the use of Timothy; for, as taken from the field at the time of blossoming, it will be found to contain less water, (table VII.,) a greater percentage of flesh and fat-forming principles, and less useless matter in the shape of woody fibre, than most of the other grasses. The deductions of science certainly correspond, in this case, with the results of practice.

A comparison of tables VII. and IX. with tables VIII. and X. will show the comparative advantages of the use of the artificial grasses, in point of albuminous or flesh-forming principles and fatty matters. The carbonaceous or heat-producing principles remain nearly the same throughout, while the percentage of waste matter or woody fibre is less than in the natural grasses. This is an important fact, worthy of the careful consideration of the farmer.

In the sixth column of table IX. will be found the percentage of ash of each of the grasses analyzed. Table XI. contains a still further analysis of this ash, which gives all the inorganic constituents which the plant derives from the soil and the manures furnished to it. It is important and suggestive to one who will examine it carefully, as indicating the kind of manure which in many cases it may be desirable to apply.

The first peculiarity which plainly appears from a glance at the ash analyses, is the very large percentage of silicates and

TABLE XI. *Analysis of the Ash of some of the Natural and Artificial Grasses.*

Common Name.	Ash in 100 parts of dried grass.	Silica.	Phos. Acid.	Sulph. Acid.	Carb. Acid.	Lime.	Magnesia.	Peroxide of iron.	Potash.	Soda.	Chloride of Potassium.	Chloride of Sodium.
Meadow Foxtail,	7.81	38.75	6.25	2.16	.65	3.90	1.28	.47	37.03	–	9.50	–
Sweet-scented Vernal,	6.32	28.36	10.09	3.39	1.26	9.21	2.53	1.18	32.03	–	7.03	4.90
Downy Oat Grass,	5.22	36.28	10.82	3.37	–	4.72	3.17	.72	31.21	–	4.05	5.66
Upright Brome Grass,	5.21	38.48	7.53	5.46	.55	10.38	4.99	.26	20.33	–	10.63	1.38
Soft Brome Grass,	5.82	33.34	9.62	4.91	9.07	6.64	2.60	.28	30.09	.33	–	3.11
Crested Dog's-tail,	6.38	40.11	7.24	3.20	–	10.16	2.43	.18	24.99	–	11.60	–
Orchard Grass,	5.31	26.65	8.60	3.52	2.09	5.82	2.22	.59	29.52	–	17.86	3.09
Orchard Grass, with seeds ripe,	5.51	32.18	6.41	3.96	2.88	8.14	3.47	.23	33.06	–	4.87	4.76
Hard Fescue Grass,	5.42	28.53	12.07	3.45	1.38	10.31	2.83	.78	31.84	–	8.17	.62
Meadow Soft Grass,	6.37	28.31	8.02	4.41	1.82	8.31	3.41	.31	34.83	–	3.91	6.66
Meadow Barley Grass,	5.67	56.23	6.04	4.29	–	5.04	2.42	.66	20.26	3.40	–	1.66
Perennial Rye Grass,	7.54	27.13	8.73	5.20	.49	9.64	2.85	.21	24.67	–	13.80	7.25
Annual Spear Grass,	2.83	16.03	9.11	10.18	3.29	11.69	2.44	1.57	41.86	–	.47	3.35
June Grass,	5.94	32.93	10.02	4.26	.40	5.63	2.71	.28	31.17	–	11.25	1.31
Rough-stalked Meadow Grass,	8.33	37.50	9.13	4.47	.29	8.80	3.22	.29	29.40	–	6.90	–
Timothy,	5.29	31.09	11.29	4.86	4.02	14.94	5.30	.27	24.25	–	.70	3.24
Annual Rye Grass,	6.45	41.79	10.07	3.45	–	6.82	2.59	.28	28.99	.87	–	5.11
Yellow Oat Grass,	5.28	35.20	9.31	4.00	–	7.98	3.07	2.40	36.06	.73	–	1.25
Red Clover,	9.56	.59	6.71	1.85	23.47	22.62	4.08	.26	36.45	–	2.39	1.53
White Clover,	–	3.68	11.53	7 21	18.03	26.41	8.15	1.96	14.33	3.72	–	4.95
Sainfoin in flower,	6.37	3.22	9.35	3.28	15 20	24.30	5.03	.61	31.90	–	6.24	.78
Sainfoin in seed,	6.50	3.49	7.97	2.33	17.36	29.67	4.59	.58	29.61	1.25	–	3.12
Italian Rye Grass in flower,	6.97	59.18	6.34	2.82	–	9.95	2.23	.78	12.45	3.98	–	2.27
Italian Rye Grass in seed,	6.40	60.62	6.32	1.31	–	12.29	2.64	.30	10.77	.13	–	5.58

potash contained in the natural grasses, and the very small comparative percentage of silica in the artificial grasses, the red and white clovers. The large percentage of lime and carbonic acid attract our attention in the latter. This table is exceedingly valuable as suggesting the proper course of manuring for the most successful cultivation of the various crops contained in it.

If now we cast our eye at the analysis of some of our com-

TABLE XII. *Analysis of Specimens of Weeds, as taken from the field, and when dried.*

Name of Plant.	Date of collection	Water.	Albuminous matter.	Fatty matter.	Heat-producing principles.	Wood fibre.	Ash.
Ox-eye Daisy, (*Crysanthemum leucanthemum,*)	June 23,	71.85	2.12	.999	12.64	10.51	1.86
Yellow Buttercup, (*Ranunculus acris,*) . .	June 13,	83.15	1.18	.507	6.26	3.00	.91
Sorrel, (*Rumex acetosa,*).	July 4,	75.37	1.90	.545	7.62	13.04	1.51
DRIED SPECIMENS OF THE SAME.							
Ox-eye Daisy, ...	– –	–	7.53	3.49	45.02	37.33	6.63
Buttercup, ...	– –	–	9.98	4.28	52.69	25.34	7.71
Sorrel, ...	– –	–	7.71	2.19	46.82	37.16	6.12

mon weeds, we shall see how far superior the cultivated grasses are in nitrogenous or nutritive principles.

The albuminous principles are very much less than in either the natural or the artificial grasses.

A line of investigation, both scientific and practical, equally interesting and valuable with the foregoing, would lead into the comparative nutritive equivalents of hay and other feeding substances. This is not the place to discuss that subject in full, the line of our present inquiry embracing only the comparative nutritive values of the grasses themselves. For convenience of reference, however, I subjoin the following table, (XIII.,) embracing the results of the profoundest researches of many distinguished chemists and practical men, both in the laboratory and the barn. Boussingault and others in France, and Fresenius, Thaer and others in Germany, have devoted to these and similar investigations the best part of their lives.

It is necessary to remark that tables of nutritive equivalents are liable to imperfections, on account of sources of error which must exist in the nature of things, as difference of soil, climate, season, imperfection of methods of analysis, &c.; but making all allowance for these, and admitting that the table cannot be absolutely, and literally correct or perfect, it possesses great practical value and interest as giving a good general idea of the relative value for feeding purposes, of various agricultural products.

In regard to the nutritive value, as based on the amount of nitrogen or nitrogenous compounds, it may be remarked that the latest and most careful experiments, conducted by most experienced and competent experimenters, tend to show that this basis is correct, so far as it can be applied to substances so analogous in composition that they can be included in one group; as for example, the different root crops possess a nutritive value in proportion to the amount of nitrogen they contain, but the nutritive value of a root ought not to be compared with a succulent vegetable, like clover, for instance, by the proportion of nitrogen in each, merely, without taking into consideration other properties. In other words, roots may be compared with each other on that basis merely, and grasses with each other, and leguminous plants with each other, but not root crops and grasses. This fact is alluded to as a possible source of error in some of the earlier researches of Boussingault, and not as materially affecting the practical value of the table.

The mode of using table XIII. is very simple. Good upland meadow hay,—or what would be called in New England, good English hay,—is taken as a standard of comparison. Now if we wished to produce the same results with carrots as with one hundred pounds of good, average English hay, we must use, according to Boussingault's column of equivalents, 382 pounds of carrots, or for each pound of hay, 3.82 pounds of carrots, and according to the practical experiments mentioned, 366 pounds, 250 pounds, 225 pounds, 300 pounds, and so on, to each 100 pounds of hay.

According to the theoretical values of Boussingault, 100 pounds of hay are equal in feeding qualities to 65 pounds of barley, 60 pounds of oats, 58 pounds of rye, or 55 pounds of wheat. While, according to the experiments of Thaer, 100 pounds of hay produced the same effect as 76 pounds of barley, 86 pounds of oats, 71 pounds of rye, 64 pounds of wheat.

With regard to the analyses of tables VII., VIII., IX. and X., some allowance should undoubtedly be made for difference of climate, since it is well known that grasses, as well as other plants, grown rapidly in a hot sun, which we usually have in the months of May, June and July, contain a much larger amount of nutritive and saccharine matter than those grown slower and in a greater amount of available moisture both in

Table XIII. *Nutritive Equivalents. (Practical and Theoretical.)*

Articles of Food.	Theoretical values: Boussingault. Water in 100 parts.	Nitrogen in 100 parts of dried substance.	Nitrogen in 100 parts of undried substance.	Nutritive equivalent.	Fresenius. Relative proportion of nitrogenized to non-nitrogenized substances.	Nutritive equivalent.	Practical values, as obtained by experiments in feeding, according to: Block.	Petri.	Meyer.	Thaer.	Pabst.	Schwertz.	Schweitzer.
English Hay,	11.0	1 34	1.15	100	–	100	100	100	100	100	100	100	100
Lucerne,	16.6	1.66	1.38	83	–	–	–	90	–	90	100	100	–
Red Clover Hay,	10.1	1.70	1.54	75	1 to 6.08	77.9	100	90	–	90	100	100	–
Red Clover (green),	76.0	–	.64	311	–	–	430	–	–	450	425	–	–
Rye Straw,	18.7	.30	.24	479	1 to 24.40	527 7-12	200	500	150	666	350	–	267
Oat Straw,	21.0	.36	.30	383	1 to 12.50	445 5-12	200	200	150	190	200	400	200
Carrot Leaves (tops),	70.9	2.94	.85	135	–	–	–	–	–	–	–	–	–
Swedish Turnips,	91.0	1.83	.17	676	–	–	–	300	–	300	250	200	–
Mangold Wurzel,	–	–	–	–	1 to 7.26	391⅓	336	400	250	460	250	333	366⅔
White Silician Beet,	85.6	1.43	.18	669	–	–	–	–	–	–	–	–	–
Carrots,	87.6	2.40	.30	382	1 to 7.84	542.1	366	250	225	300	250	270	300
Potatoes,	75.9	1.50	.36	319	1 to 9.00	330 5-12	216	200	150	200	200	200	200
Potatoes kept in pits,	76.8	1.18	.30	383	–	–	400	–	–	–	–	–	–
Beans,	7.9	5.50	5.11	23	1 to 2.8	34 5-12	30	54	50	73	40	–	30
Peas,	8.6	4.20	3.84	27	1 to 2.14	34⅓	30	54	48	66	40	Boussingault. 59	30
Indian Corn,	18.0	2.00	1.64	70	1 to 6.55	–	–	52	–	–	–	–	–
Buckwheat,	12.5	2.40	2.10	55	1 to 6.05	93 5-12	–	64	–	–	–	–	–
Barley,	13.2	2.02	1.76	65	1 to 4 25	–	33	61	53	76	50	–	35
Oats,	12.4	2.22	1.92	60	1 to 4.08	58 11-12	39⅓	71	–	86	60	–	37½
Rye,	11.5	2.27	2.00	58	1 to 4.42	58 1-16	33	55	51	71	50	–	33⅓
Wheat,	10.5	2.33	2.09	55	1 to 2.42	38 5-6	27	52	46	64	40	–	30
Oil-cake (Linseed),	13.4	6.00	5.20	22	–	–	42	108	–	–	–	–	43

the atmosphere and the soil, which is ordinarily present in the climate of England. Every observing farmer knows that grasses grown on our low, reclaimed swamp lands, for instance, make less milk, and less flesh and fat in animals, than the same species grown on our dry, upland soils. The same difference must exist, to some extent, between our grasses and the grasses grown in a comparatively moist climate, where they have the advantage of more frequent rains, which push them to a more complete development and give them greater luxuriance, increasing, of course, the quantity of their produce, while their quality cannot be improved in the points alluded to. This subject will come more properly under discussion in treating of the

INFLUENCE OF THE SEASONS.

We now come to consider the influence which the season or the climate has upon the quantity and nutritive quality of grass. Before entering upon this topic, it is proper to remark, that in order to bring together the practical wisdom and judgment of some of the best farmers in the State, as well as to be able to present some statistical information in regard to the product of grass and hay for the past season, I directed the following circular to one or more farmers in every town in Massachusetts, asking for replies from each.

BOARD OF AGRICULTURE, STATE HOUSE,
Boston, Sept. 1, 1856,

DEAR SIR:—Will you have the goodness to reply to the following inquiries in reference to the grass and hay crop of your town, according to the best of your judgment and experience? If circumstances prevent your giving it personal attention, will you be kind enough to put it into the hands of some one interested in the subject in your neighborhood, who will do me the favor to answer it?

1. What was the estimated yield of grass and hay in your town this season, as compared with others? If above or below the average, how much?

2. What, in your opinion, is the effect of a wet or a dry season on the quality of grass and hay? Is grass grown in the shade as good as that grown in the sun, and what is the difference?

[This question embraces the intrinsic value of hay this season as compared with the crops of 1854 and 1855, both comparatively dry seasons, while this has been unusually wet in most parts of the State.]

3. In what month do you prefer to seed down land designed for mowing, and what is the reason of your preference?

4. What varieties of grass seed do you usually sow for mowing, and what for permanent pasturage, and in what quantities and proportions, per acre?

5. Do you prefer to sow grass seed alone in either case, or with some variety of grain? If the latter, why, and with what grain?

6. Have you cultivated or raised orchard, fowl meadow, or blue joint grasses, and with what result as compared with the yield and value of other grasses?

7. At what stage of growth do you prefer to cut grass to make into English and into swale hay, and what is the reason for your preference?

8. What is the best mode of making hay from Timothy, from red-top, and from wet meadow grass, and at what state of dryness do you consider it made, or fit to get into the barn?

[This question embraces, to some extent, the time taken to make it under ordinary circumstances of good weather, &c. This, of course, varies greatly, but some farmers would dry grass cut in the blossom two good hay days, while others would prefer to cure it less, and get it in on the day it was cut.]

9. Will you state in detail how you make or cure clover, and how, when so cured, it compares in value with other kinds of hay to feed out to farm stock?

10. Have you used hay caps, and if so, with what result, in point of economy? How were they made and at what cost?

11. Have you used a mowing machine, and if so, what patent, with what power, and with what advantage?

12. At what height from the ground do you prefer to have your grass cut, and why?

13. Have you used a horse-rake, and if so, what patent, and with what advantage?

14. Do you feed off the after growth of your mowing lands in the fall? Do you think it an injury or a benefit to the field to feed it off?

15. Do you top-dress your mowing or pasture lands, and if so, what manure do you prefer to use, at what time, and in what quantities do you apply it?

16. What is the best mode of renovating old worn out pasture lands?

17. If you have any experience in ditching and draining wet meadow, or ditching or diking salt marsh, will you state the result, and the comparative value of the grass before and after the operation?

18. What are the most valuable varieties of salt marsh grasses, and how does the hay made from them compare in value with good English hay?

19. Have you any experience in irrigating mowing or pasture lands, and if so, what is the result?

20. Do you prefer to salt your hay when putting into the barn, and if so, what quantity do you use, per ton?

21. What do you consider the best mode of destroying couch or twitch grass?

22. What is the best mode of destroying the white weed or ox-eye daisy?

23. Will you give any other details not suggested by the above, which, in your opinion, may be considered important, in regard to this crop, and particularly if you have experimented with any varieties of grass not in general cultivation, such as lucerne or alfalfa, rye grass, brome grass, Kentucky blue grass, &c., will you state the results as fully as possible? If you have any varieties of grass found to be valuable but not in general cultivation, the names of which are not known to you, will you send them to this office where the names will be given?

Very respectfully, your obedient servant,

CHARLES L. FLINT,

Secretary of the Board of Agriculture.

I am indebted to the kindness of many enterprising and intelligent farmers for full and valuable answers from more than two hundred towns in the State, and these alone would make a valuable volume of themselves. I can, of course, do no more than extract from them as freely as space will permit, which I shall do at greater length in the subsequent sections.

No crop, perhaps, is more dependent on the seasons than the grasses. Every farmer knows that a moist spring, with rains evenly distributed over the months of April, May and June, will insure him the most luxuriant crops of grass and hay; and he knows, also, that a dry, cold spring is fatal to their rapid and healthy development, and that he must, in such a spring, expect a comparatively small crop. These and many similar facts are familiar to the commonest practical observation.

It has also been found by observation that the grasses will vegetate when the temperature of the air is above the freezing point of water, 32° Fahrenheit, provided the temperature of the soil ranges from 35° to 40,° while a lower temperature checks their growth. Vegetation, at temperatures higher than these, depends much on the amount of moisture and heat, both

of the soil and the atmosphere. Grass will not vegetate when the temperature of the air is higher than 66° unless the soil is very moist. When the vapor of the air is at its maximum, or when the air is saturated with moisture, vegetation advances with the greatest rapidity, and this most frequently happens with us in the earlier growing months, April, May and June. But when the moisture in the atmosphere is slight, and the soil becomes dry, and the subsoil is porous, the turf of our fields and pastures suffers from the drought, and scarcely a year passes over us when this does not happen.

A writer in the Journal of the Royal Agricultural Society, (quoted in the Farmers' Magazine, Vol. ix., No. 5, Third Series,) after many careful observations, comes to the conclusion, First. That the growth of grass is always proportionate to the heat of the air, if a sufficiency of moisture be present in the atmosphere. Second. That in the climate of England the moisture present is rarely sufficient to allow the temperature to have full effect, when that temperature exceeds 56°, but that if moisture be artificially supplied, as by irrigation, to catch water meadows, that then vegetation will still proceed in proportion to the heat. Third. That when the temperature of the air is between 36° and 41°, the grass will only vegetate with a fifth part of the force that it will when the temperature is 56°. Thus the land that will keep ten sheep per acre in the latter case, will only keep two in the former. That from 41° to 46° its growth is two-fifths, or double that of its growth when the temperature is under 41°, and it will then keep four sheep instead of two. Again, from 46° to 50°, its growth will rise to seven-tenths, or it will keep on the same ground from five to seven sheep, and from 50° to 66°, it generally—unless assisted by an artificial addition of moisture—arrives at its maximum; but if the month of June be very moist, it will continue to grow with an increase of force up to 60°.

Our climate is very different from that of England. The evaporation from the soil is ordinarily very much more rapid, and the actual amount of moisture in the air is greater, since it is well established that the evaporation is in proportion to the height of the temperature and the extent of water or land surface; that in the temperate zones it amounts to about thirty-seven inches a year, while in the tropics it rises to from ninety

to one hundred inches, and that the atmosphere when at the freezing point contains about a two-hundredth part of its weight of water, while at 52° it contains a hundredth part, or twice as much; at 74°, a fiftieth part, or four times as much, and at 98°, a twenty-fifth part, or eight times as much, and so on in that ratio. Now although the mean annual temperature of the two countries is about the same,—it being near London about 48° 5′, and at Boston 48° 9′,—yet the temperature of the growing months of the two countries presents a marked difference, the mean temperature of every one being with us much higher. But the climate of England is proverbially moist, notwithstanding that the mean annual fall of rain near London is only little over twenty-five inches, while the quantity which falls at Boston is over forty-two inches. The amount of sensible moisture of the atmosphere is greater in England than here, though the actual amount existing in our atmosphere must exceed that of the atmosphere even in the eastern part of England. Our soil is consequently dryer, and unless we have frequent rains vegetation suffers sooner, and the growth of grass is liable to be checked for the want of moisture. This actually happens more or less nearly every year. But the spring of the past year was an exception, for the quantity of rain in most parts of the State was not only somewhat larger than usual, but it was well distributed over the spring months; that is, it fell frequently and in small quantities. This, as is usually the case, caused an early and remarkably luxuriant growth of grass, while the quality was not generally considered so good as the average. It may be laid down as a well-fixed principle, that the grass crop is better from large quantities of rain falling at once and at longer intervals,—provided it does not come in torrents to prostrate the crop, and that the intervals are not so long as to produce droughts, which are always attended with deleterious effects,—than from smaller quantities falling with greater frequency. The quantity in the latter case will not ordinarily be so great as in the former, but it is more than compensated, it is thought, by the increased value. More accurate statistics will throw light on this subject.

As a means of comparison, the following table of the mean monthly temperature and rain at the observatory at Cambridge, during the growing months of 1854, '55 and '56, will be found

convenient. The observations were made four times a day, at sunrise, 9 A. M., 3 and 9 P. M. The latitude being 42° 22′ 48″, the longitude 71° 1′.

Months.	Mean Temp. in 1854.	Rain in 1854.	Mean Temp. in 1855.	Rain in 1855.	Mean Temp. in 1856.	Rain in 1856.
				Inches.		Inches.
March, . . .	33°.1	2.949	32°.31	1.159	26°.98	0.970
April, . . .	42°.9	4.842	44°.08	3.990	45°.82	3.732
May, ...	57°.7	5.453	53°.40	1.501	52°.55	6.732
June, . . .	65°.9	3.585	65°.48	3.581	68°.08	2.869
July, ...	72°.9	3.239	72°.24	4.845	72°.76	4.243
August, . . .	68°.6	0.351	67°.31	2.270	67°.31	14.981
September, . .	61°.4	4.36 0	61°.45	1.216	62°.98	–

The mean temperature and the rain at Amherst, during the growing months of 1856, was as follows:—

Temperature.		Amount of Rain.		Average of 18 years.
	Fahr.		Inches.	Inches.
March, ...	25°.88	March, ...	1.118	3.05
April, ...	46°.44	April, ...	2.510	3.27
May, ...	55°.58	May, ...	5.313	3.91
June, ...	68°.66	June, ...	1.920	3.22
July, ...	72°.93	July, ...	1.955	4.05
August, ...	66°.19	August, ...	12.132	4.40
September, ...	60°.79	September, ...	3.472	3.26

The first of these places represents the eastern section of the State, the second, the western; and observations made at Boston, at Bradford, at Salem and elsewhere in the eastern part, do not materially differ from those at Cambridge, while the observa-

tions at Williamstown and at Albany, N. Y., do not differ materially, so far as practical deductions are concerned, from those at Amherst.

The amount of rain at Worcester, in the central section, in 1854, '55 and '56, was as follows:—

Months.	1854.	1855.	1856.	Average for 15 years.
	Inches.	Inches.	Inches.	Inches.
March,	3.45	.23	1.69	3.29
April,	6.69	5.39	3.34	3.98
May,	6.78	1.64	6.55	4.36
June,	3.05	4.19	1.44	2.93
July,	5.68	9.40	2.68	3.70
August,	.35	4.06	13.14	5.58
September,	5.53	.20	3.39	3.47

The amount of rain at Providence, R. I., on our southern border, was as follows:—

Months.	For 1856.	Average of 25 years.
	Inches.	Inches.
April,	2.80	3.57
May,	4.10	3.33
June,	2.47	2.95
July,	4.20	2.91
August,	5.75	3.70
	19.32	16.46

The amount of rain which fell at Bradford, in Essex county, in the month of August alone, was sixteen inches, the greatest, probably, ever known in one month in New England, while at Nantucket it was but a fraction over one inch; so that while

the vicinity of Boston and the eastern part of the State, generally, was abundantly supplied, the wet meadows being flooded, and thousands of tons of swale hay ruined, the island of Nantucket and some parts of Barnstable and Plymouth counties were suffering severely from drought, vegetation being entirely parched up.

So great is the dependence of the grasses upon heat and moisture combined, that, knowing the results of observations of the thermometer and the rain gauge in any section, during the three growing months of April, May and June, one might predict with great certainty the results of the harvest in that section; and, on the other hand, the returns of practical farmers in different sections of the State, indicate so clearly and uniformly the excess above the average, or the partial failure of the crop, that a meteorological map of the State might be constructed from them.

As might be expected, therefore, from what has already been said, the yield of grass and hay throughout most parts of this State during the past year, has been somewhat above the average, the best judges estimating the excess variously from one-eighth to one-half, and it has, doubtless, in some localities, reached this latter estimate, though the general average was not, probably, over an eighth above that of other years.

It may be inferred, also, from what has been said, that the quality was not quite equal to the average, and this was unquestionably the case, where the excess in quantity was due to the excess of moisture and the rains.

The remarks of an experienced, practical farmer of Kentucky, express very well the general estimate made by our farmers in reply to the second question proposed in the above circular. "Just so far," says he, "as there is shade, is the grass deficient in saccharine and nutritious qualities; that grass which is most exposed to the sun being best. Woodland pastures will keep young stock growing and old ones on foot, but will not fatten them. A three-year old Durham will get 'stall fat' in a year on *open* blue grass." And so a farmer of Hampshire county, says: "Grass grown in the shade is lighter and does not contain so much nutriment. Wet seasons increase the weight and bulk of the crop, but the same weight does not contain the amount of nutritive matter of hay raised in a dry

season. And another of Worcester county: "Hay grown in a dry season contains more nutriment. This is particularly noticeable in the condition of cattle in the spring following a dry season. I do not consider grass grown in a dense shade worth over half price;" while a farmer of great observation, in Middlesex county, says: "From an experience of fifty years in making hay, and thirty-five in feeding it out and selling it, I should say that in a wet season I never found any thing like so much heart or nutriment in hay as in a dry one. Grass grown under a thick, shady tree is not worth one-half as much as that grown in the sun. The grass this year in this town was well set in the spring and grew very quick when the warm weather came on, but still we had much good, warm sun to bring it to maturity, and I think it will spend pretty well, but probably not quite as well as the same bulk last year. Since the fifth of September we cut our salt hay in this town and never found it cleaner or better, and I think it will spend well." And another practical farmer remarks: "I think grass and hay are not so good in a wet season. We lose about one-third in the quality of what we gain in the quantity. Grass grown in the shade is not worth more than two-thirds as much as that grown in the sun."

It is not necessary to multiply the authorities of practical farmers on this point, since they uniformly coincide with the testimony given above, and it may be regarded as fully established as the result both of scientific investigations and of practical experience, that both the quantity and the quality of grass are in proportion to the heat or sunlight and the moisture in which it is grown.

What has been said will explain the suggestion in the last section with respect to the allowance which it may be proper to make in the analyses of grass grown in a climate of less heat and less sunshine than our own. It will also lead to the conclusion that our own grasses grown on low, moist lands, are neither so sweet nor so nutritious as the same species grown on higher and dryer soils; and it is a fact which has fallen under the observation of practical farmers, that the grasses on low lands do not produce so much nor so good a quality of milk, nor so much fat in animals as the same species of grass grown on upland soils.

Closely connected with the influence of the seasons is the

TIME FOR SOWING GRASS SEED.

More than sixty years ago careful experiments were made in this State, in the hope of obtaining such information as would settle the question as to the best time of sowing grass seed, and the practice of seeding down in the fall was then commenced by a few individuals. At and before that time, the practice of sowing in the spring was universal, and the same custom has very generally prevailed till within a very few years. Both the practice and the opinion of the best practical farmers among us have changed to a considerable extent, and it is now commonly thought best to sow grass seed in the fall, early in September, if possible, mixing no grain or any thing else with it, though there are, and always will be, some cases where the practice of sowing in the spring with grain is convenient and judicious. There can be no doubt that it is, in most cases, an injury to both crops to sow them together. The following statement of an experienced and successful farmer will enable us to comprehend how the change was brought about, though others had tried the same experiment long before him. "More than twenty years ago we had several dry summers, in the springs of which I had sown grass seed with rye, barley and sometimes wheat and lost most of my seed by the drought. I could scrape it up, the plants being dead and dry, when small. Since that time I have universally ploughed after haying and sowed Timothy grass and redtop."

Other farmers probably experienced the same difficulty and came to the same conclusion. Our seasons differ greatly to be sure, but it is now well understood that we must calculate on a drought in some part of the summer, and grass will suffer more from drought than from frost. Hence the propriety of fall sowing. There are some localities, undoubtedly, where spring sowing with grain is best, on the whole, as in the south-eastern sections of the State, along the coast, where on account of the proximity of the sea, the ground is often but slightly covered and protected with snow; yet even there, some farmers say it is better to seed in August and September. Few general rules

are of universal application in agriculture, and the farmer must constantly exercise sound judgment and common sense. One practical farmer of Essex, in answer to the circular, says: "I prefer August, because I think it less liable to winter-kill than summer-kill. And another greater reason is, that in fall seeding I get rid of a crop of weeds, while in spring seeding my ground is seeded with them." An experienced farmer of Hampshire county, writes: "I rather prefer the last week in August for seeding down land. The reason is, that we frequently have a summer drought which kills out the young grass." One of the best farmers of Middlesex, says: "When sown alone I prefer from the 20th of August to the 20th of September. If sown sooner, the summer droughts are apt to injure the young blades; if later, they do not have a chance to expand and arrive at that degree of maturity necessary for a good crop the ensuing season." He says, also, that if in any case it is found necessary to sow with grain, it should be in the spring and not in the fall. An experienced practical farmer of Essex county, recommends "The latter part of August and the month of September for seeding down land to grass for mowing, unless that season should be very dry; in that case, sow so soon after a rain as may be. I do not think it advisable to sow grass seed when the earth is very dry, as some of it may, by the moisture brought up in preparing the land, sprout, but not having continued moisture to support it, will wither away, while some of the lighter seeds will, perhaps, swell by moisture, but fail to sprout for a lack of nourishment, and consequently perish, while others will be blown away by the winds. The plant from seed sown in August or September, if the season is moist, will take deep root and be prepared to withstand the changes of winter. Grass seed sown with grain in the spring is liable to be killed in the hot days of July and August, about the time of cutting the grain, particularly on light, sandy or gravelly lands. Clover should be sown in the spring as soon as convenient after the frost is out of the ground, on land seeded down the preceding autumn, probably, rather than sooner, in the autumn, as the winter is often too severe for the tender roots."

A farmer of Worcester county, says: "On moist land I prefer to turn over the green sward after haying, with a Michigan

plough, and seed in August, after spreading on a coat of manure to give the grass an early start." A farmer of Franklin county, writes: "I consider the month of August as the best time to seed down land for mowing, with the exception of clover, and that I sow early in spring." Another from Hampden: "I think August or the early part of September is the best time to seed down grass land, as in the fall of the year it will get root and not be burned up by the sun, as it would be in spring." Another says: "I sow from the middle of August to the middle of September. If sown in spring with oats or other grain, the young grass is liable to be summer-killed, either choked by the ranker growth of the grain, or scorched by the hot sun when the grain is taken off. If sown in spring without grain there is one season lost."

A farmer on the Connecticut River states, that "If the season is not too dry, August is a good month to seed for mowing. Have had very good success in seeding with turnips, or grass seed alone, in August or September, to mow the next year; but the usual practice here is to seed with wheat or rye in September or October. Some seed in spring with oats, but generally it does not do well. Clover is more often sown in the spring, because it winter-kills." Another, writing from the northern part of Worcester county, says: "There is a difference of opinion among farmers in this region on this subject; some prefer to sow the grass seed with the spring grain in May, while others prefer to sow in August. The latter, no doubt, is the best practice, if the ground is sufficiently moist."

A very successful farmer of Berkshire, advises, "August or September. I have sown in the month of October with good success. Seed sown in August obtains more root than when sown later, and consequently, is not as liable to winter-kill. It also starts earlier the succeeding spring, thereby keeping down the weeds. Much of our moist meadow lands,—too wet for hoed crops, and producing but light crops of grass, and that of an inferior quality,—may be made to produce well by ploughing and seeding. Let them be ploughed deep in August or September, the surface well-harrowed and covered with a light coat of compost, ashes or barnyard manure, and seeded, and the next year the crop will repay all expense." But on the other hand, a practical farmer on the island of Martha's Vine-

yard, Duke's county, says: "I prefer seeding down land designed for mowing, in April, for the reason that if sown in March the ground becomes so compact from the effects of heavy rains that the seed does not come up well, and if sown in August or September the grass does not attain that degree of maturity to enable it to withstand the frequent freezing and thawing of the succeeding winter. We usually have but little snow to protect the young grass on this island. The objection to sowing grass seed after English harvest will not probably apply to those places where the winters are less changeable."

Another says: "I have sown grass seed in the months of March, April, May, August, September and October. On a rich, compact, retentive soil, seed has done well sown in April or May, but I prefer to seed my land of any description in August, or on a light snow in March. My reason is, that when I have seeded my ground in the spring I have sown rye or oats with the grass seed generally; if not, a crop of weeds would come up and usurp the place of the grasses and choke them out, and a hot and dry July and August would exterminate what escaped the oats and weeds."

Thus, the opinions and practice of farmers is divided on this question, each one being influenced in part by the character of his land and his crops. But it will be found that no season is without its exposure to loss, for if we sow in autumn and have an open and severe winter with frequent changes from comparatively warm and thawing weather to excessive cold, the young grass will be likely to suffer, while if we sow in spring with some kind of grain, as oats, barley or rye, and have a drought in spring or summer, as we generally do, the grass may be injured and may be entirely killed. No invariable rule for all soils and seasons can be given. But the weight of authority seems to fix upon early autumn as the best season to sow grass seed; sowing it alone without a grain crop, and the losses from proper seeding down, at that season are probably considerably less, in an average of years, than those which arise from spring sowing with grain.

But whatever time may be chosen for sowing, it is very important that the seed bed should have been thoroughly tilled and properly prepared and manured. But instances have fallen under my immediate observation where land which had become

"hide-bound" and worn out, producing but a light crop of grass, was very much benefited by being turned over in September and having a dressing of compost harrowed in, grass seed being then sown alone. The crop even of the next year was much greater than that of previous years and nearly paid for the labor of ploughing and seeding by its increase.

No rule in regard to the time of seeding down land, which should be found to work best in one latitude, would necessarily apply in a different climate, and under different circumstances.

After having determined upon the time of sowing, the next question in the farmer's mind is as to the

SELECTION OF SEED.

In general, too little attention is paid to the selection of seeds, not only of the grasses, but of other cultivated plants. The farmer cannot be sure that he has good seed unless he raises it for himself or uses that raised in his neighborhood. He too often takes that which has passed through several hands, and whose origin he cannot trace. Bad or old seed may thus be bought, in the belief that it is good and new, and the seller himself may not know any thing to the contrary. The buyer, in such cases, often introduces weeds which are very difficult to eradicate. The temptation to mix seeds left over from previous years with newer seed, is very great, and there can be no doubt that it is often done on a large scale. In such cases the buyer has no remedy. He cannot return the worthless article, and the repayment of the purchase money, even if he could enforce it, would be but poor compensation for the loss of a crop. The seeds of some plants retain their vitality much longer than others. Those of the turnip, for instance, will germinate as well, or nearly as well, at the age of four or five years as when only one or two years old. But the seeds of most of the grasses are of very little value when they have been kept two or three years, and hence the importance of procuring new and fresh seeds, and guarding against any mixture of the old and worthless with the new, as carefully as possible.

It is easy to tell whether the germinative power of grass or any other seed still remains, by the following simple method,

and if the buyer should be willing to try it, he might purchase only a small quantity at first, and afterwards obtain his full supply with more confidence if the trial showed it to be good. Take two pieces of thick cloth, moisten them with water and place them one upon the other in the bottom of a saucer. Place any number of seeds which it is desired to try, upon the cloth, spreading thin, so as not to allow them to cover or touch each other. Cover them over with a third piece of cloth similar to the others and moistened in the same manner. Then place the saucer in a moderately warm place. Sufficient water must be turned on from time to time to keep the three thicknesses of cloth moist, but great care must be taken not to use too much water, as this would destroy the seed. There should be only enough to moisten the cloths, and not enough to allow any to stand in the saucer. Danger from this source may be avoided in a great measure, however, by tipping up the saucer so as to permit any superfluous water in the saucer to drain off. The cloth used for covering may be gently raised each day to watch the progress of the swelling or the moulding of the seeds. The good seed will be found to swell gradually, while the old or poor seed, which has lost its germinating power, will become mouldy in a very few days. In this way, also, any one can judge whether old seed is mixed with new. The latter will germinate much more quickly than the former. He can judge, besides, of the quantity which he must sow, since he can tell whether a half, or three-fourths, or the whole will be likely to germinate, and can regulate his sowing accordingly. The seeds of the clovers, if they are new and fresh, will show their germs on the third or fourth day; other seeds will take a little longer, but till they become coated with mould there is hope of their germinating. As soon as the mould appears it is decisive, and the seed that moulds is worthless.

MIXTURES OF GRASS SEED.

It is difficult to overestimate the importance to the farmer of a good selection and proper mixture of grass seeds for the various purposes of cultivation, for mowing, for soiling, for permanent pasturage, or for an alternate crop.

Doubtless the varieties of seed usually sown in this State, consisting almost exclusively of Timothy and redtop, with a mixture of red clover, are among the best for our purposes, and their exclusive use is, in a measure, sanctioned by the experience and practice of our best farmers; yet, it would seem very strange indeed, if this vast family of plants, consisting of thousands of species and varieties, and occupying, as already intimated, nearly a sixth part of the whole vegetable kingdom, could furnish no more than two or three truly valuable species.

When we consider also, that some species are best adapted to one locality, and others to another, some reaching their fullest and most perfect development on clay soils and some on lighter loams and sands, we cannot but wonder that the practice of sowing only Timothy and redtop on nearly all soils, clays, loams and sands indiscriminately, both on high and low land, should have become so prevalent. It is equally remarkable that while but very few of our grasses, and these for the most part species peculiar to sterile soils, flourish alone, but nearly all do best with a mixture of several species, it should so constantly have been thought judicious to attempt to grow only two prominent species together with merely an occasional addition of an annual or a biennial clover, which soon dies out. When this course is pursued, unless the soil is rich and in good heart, the grass is likely to grow thin and far between, producing but half or two-thirds of a crop, whereas the addition in the mixture of a larger number of species, would have secured a heavier burden of a better quality. These considerations, it seems to me, indicate the true direction in which the farmer who wishes to "make two spires of grass grow where one grew before" without impoverishing the soil, should turn his attention.

I hold this proposition to be indisputable, that any soil will yield a larger and more nutritious crop if sown with several kinds of nutritious grasses, than when sown with only one or two species. Indeed, it is a fact well established by careful experiment, that a mixture of only two or three species of grasses and clover, will produce a less amount of hay than can be obtained by sowing a larger number of species together. There may be some exceptions to this rule, as in cases where the yield of Timothy and redtop, owing to the peculiar fitness

of the soil for these grasses, is as great as can stand on the ground covered by them.

But it is nevertheless true, that if we sow but one kind of grass, however abundantly the seed may be scattered, or on whatever soil it may be, or under however favorable influences, yet only a part of the plants will flourish; vacant spaces will occur throughout the piece which will be filled up after a time by grasses of an inferior quality, weeds or mosses. This is the case in some degree also, where only two, or a small number of species are sown; while if a mixture made up of a larger number of kinds of seed is used, the plants will cover the entire surface and produce a far better quality of herbage.

In sowing such a mixture of several different species, we do but follow nature, who after all, will generally be found to be the best teacher, for wherever we cast our eyes over an old, rich, permanent pasture, we ordinarily see from fifteen to twenty species of grass or forage plants growing in social profusion. If the soil be very poor, as a cold, hard clay, or a barren sand, perhaps two or three varieties will suffice, but on good soils a larger number will be found to be far more profitable. Especially is this the case where the land is to be left in grass for some years and eventually be pastured, as is frequently done in New England, for it is then desirable to have grasses that reach their maturity at different times, as a constant succession of good feed throughout the season may thus more surely be obtained. It is well known that there is no month of spring or summer in which some one of the grasses does not attain to its perfection, if we except the month of March. For good soils, eight or ten species of the grasses or six or eight of the grasses proper and one or more of other herbage plants would probably be found to be profitable.

I am aware that the prevailing practice is decidedly against the use of any thing but Timothy, redtop and clover, and that very large crops of these grasses are often raised, but it is nevertheless true that we obtain on an average less than a ton to the acre, while with the same culture and a larger number of species we ought to get double that quantity.

Before proceeding to consider the proportions in which the different species should be mixed, it may be well to refer to the mode generally adopted for estimating the quantities of seeds

their relative weight. And I may remark here that the prevailing practice of buying and sowing grass seeds by measure rather than by weight, seems injudicious to say the least. It is well known that old or poor seed weighs less than that which is fresh and new. Now if a farmer buys by weight, even if he does get an old or inferior quality of seed, he gets a much larger number of seeds, and this larger quantity of seed which he receives for his money, may make up for the inferior quality, and he will have a larger number of seeds capable of germination than he would have if he bought by measure. It is to be regretted that it has become so nearly universal to purchase by measure, though as this course is for the seller's advantage, it may be difficult to change the custom.

The following table, containing the weight per bushel of the seeds of the most important agricultural grasses, has been prepared chiefly from a valuable treatise on the grasses by the Messrs. Lawson, of Edinburgh, who have paid much attention to this subject, and whose experience and observation in the practical culture of the grasses has probably been larger and more extensive than those of any other seedsmen.

This table will be found to be exceedingly valuable for reference.

Column 1 contains the common names of the grasses.

Column 2, the average number of pounds in a bushel of the seeds.

Column 3, the average number of seeds *in an ounce*.

Column 4 shows the depth of soil in inches and fractions of an inch at which the greatest number of seeds germinate.

Column 5 shows the depth of soil in inches and fractions of an inch at which only one-half the seeds germinated.

Column 6 shows the least depth of soil in inches or fractions of an inch at which none of the seeds germinated.

Column 7 shows the average percentage of loss in the weight of the grass in making into hay, when cut in the time of flowering.

The weight of seeds varies, of course, somewhat, from that stated in the above table, according to their quality. Those given in the table are the average weights of good, merchantable seed. In some States, as in Wisconsin, for instance, the legal weight of Timothy seed is forty-six pounds to the bushel. The weight of a bushel will depend in part, also, upon the

thoroughness with which it is cleaned. The seeds of the different varieties of rye grass differ in weight, varying from twenty to thirty pounds per bushel; but the average is about twenty-six pounds.

TABLE XIV. *Weight of Grass Seeds, and depth of Covering.*

1.	2.	3.	4.	5.	6.	7.
Whitetop,	13	500,000	0 to ¼	½ to ¾	1	.65
Redtop,	12	425,000	–	–	–	.63
Hassock Grass,	14	132,000	0 to ½	¾ to 1	2½	.65
Meadow Foxtail,	5	76,000	0 to ½	1 to 1¼	2½	.57
Sweet-scented Vernal,	6	71,000	0 to ½	1 to 1¼	2	.45
Tall Oat Grass,	7	21,000	½ to ¾	1½ to 1¾	4	–
Slender Wheat Grass,	10	15,500	0 to ¼	½ to ¾	2	–
Crested Dog's-tail,	26	28,000	–	–	–	–
Orchard Grass,	12	40,000	0 to ¼	¾ to 1	2½	.29
Hard Fescue,	10	39,000	0 to ¼	¾ to 1	2½	–
Tall Fescue,	14	20,500	0 to ½	1 to 1¼	2¾	.52
Sheep's Fescue,	14	64,000	0 to ¼	¾ to 1	2	.65
Meadow Fescue,	14	26,000	0 to ½	¾ to 1	2½	.60
Slender, or Spiked Fescue,	15	24,700	–	–	–	–
Red Fescue,	10	39,000	–	–	–	–
Reed Meadow Grass,	13	58,000	¼ to ½	¾ to 1	2½	.30
Common Manna Grass,	15	33,000	–	–	–	.35
Meadow Soft Grass,	7	95,000	¼ to ½	¾ to 1	2½	.73
Italian Rye Grass,	15	27,000	0 to ½	1 to 1¼	3½	–
Perennial Rye Grass,	18 to 30	15,000	¼ to ½	1½ to 1¾	3½	.50
Millet Grass,	25	80,000	¼ to ½	1 to ¼	2¾	.38
Reed Canary Grass,	48	42,000	–	–	–	.32
Timothy,	44	74,000	0 to ¼	¾ to 1	2	.50
Wood Meadow Grass,	15	173,000	–	–	–	.31
June, or Spear Grass,	13	243,000	–	–	–	.57
Rough-stalked Meadow Grass,	15	217,000	0 to ¼	½ to ¾	1½	.72
Beach Grass,	15	10,000	½ to 1	1½ to 1¾	4	–
Yellow Oat Grass,	5½	118,000	0 to ½	¾ to 1	2	–
Red Clover,	64	16,000	0 to ½	1¼ to 1½	2	–
Perennial Clover,	64	16,000	0 to ½	1¼ to 1½	2	–
White Clover,	65	32,000	0 to ¼	½ to ¾	1½	–
Lucerne,	60	12,600	–	–	–	–
Sainfoin,	26	1,280	¾ to 1	2 to 2¼	4½	–

The number of seeds of each species in a pound, may be found, of course, by multiplying the numbers in column three by sixteen, the number of ounces in a pound. It is obvious, however, that these numbers must vary, like the number of pounds in a bushel, for it is evident that the lighter the seed, the greater will be the number of seeds in a pound. The numbers stated are the average obtained by careful and repeated trials.

The results obtained in columns 4, 5 and 6, were obtained by careful experiment, and will be found to be very suggestive.

The fact that the soil used in the experiments to ascertain the proper depth of covering was kept moist during the process of germination, though freely exposed to the light, accounts for the large number of seeds germinated without any covering whatever. In ordinary field culture some slight covering is desirable; but the figures in column 6 show the important fact that in our modes of sowing and covering there must be a great loss of seed from burying too deep, though the depth should be governed somewhat by the nature of the soil, as its usual moisture or dryness.

I have already expressed my opinion that we limit our mixtures to too few species, thus failing to arrive at the most profitable results, and have said that, in a piece of land seeded with one or two favorite grasses only, small vacant spaces will be found, which, in the aggregate will diminish very considerably the yield of an acre, even though they may be so small as not to be perceived. It might be thought that this could be avoided by putting into the ground a very large number of seeds. But a knowledge of the quantities of seed ordinarily used in this State for sowing, and an inquiry as to the number of plants necessary to cover the ground with a thick coating of grass, will show that this is not the case. I have in my possession letters from some of the best farmers in Berkshire, Plymouth and other counties of the Commonwealth, in which they state it to be the prevailing practice to sow a bushel of redtop, a half bushel of Timothy, and from four to six pounds of red clover to the acre. Some of them vary the proportions a little, as by the use of one peck of Timothy and a larger quantity of clover, but the general practice is to use nearly the quantities stated, some even using a considerable larger quantity. Now if we examine the table we shall find that in an ounce of redtop seed there

are 425,000 grains. In a pound there are 6,800,000 seeds; in a bushel, or twelve pounds, there are 81,600,000 seeds. Now take only one peck of Timothy seed to mix with it. In an ounce of Timothy grass seed there are 74,000 grains. In a pound there are 1,204,000 grains. In eleven pounds, or a peck, there are 13,244,000 seeds, and if we take but four pounds of clover, which is below the average quantity used, we shall find by the same process that we have 1,024,000 seeds. If now we add these sums together, we shall find that we have put upon the acre no less than 95,868,000 seeds! This gives over 15 seeds to the square inch, or about 2,200 seeds to the square foot!

Again, one of the most intelligent farmers of Middlesex county, a practical man, uses five pecks of redtop and twelve quarts of Timothy seed per acre, for mowing lands, and an addition of five pounds of white clover for pastures, making no less than 124,426,000 seeds per acre. There must be, evidently, an enormous waste of seed, or an extensive destruction of plants, for if we take nature for our guide, we shall not find any thing like that amount of plants on an inch or a foot of our grass lands. Now let us see from a very careful trial how many plants and how many species are to be found in a square foot.

TABLE XV. *Average number of Plants and Species to the square foot of Sward.*

CHARACTER OF THE TURF.	Whole number of plants on the square foot.	Natural grasses.	Clover, and other plants.	Distinct species.
1. A square foot taken from the richest natural pasture, capable of fattening one large ox or three sheep to the acre, was found to contain	1,000	940	60	20
2. Rich old pasture, capable of fattening one large ox and three sheep, per acre,	1,090	1,032	58	–
3. Another old pasture contained	910	880	30	12
4. An old pasture of a damp, moist, and mossy surface,	634	510	124	8
5. A good pasture, two years old, laid down to rye grass and white clover,	470	452	18	3
6. A sod of narrow-leaved meadow grass, (poa angustifolia,) six years old,	192	–	–	1
7. A sod of meadow foxtail by itself, six years old,	80	–	–	1
8. Rye Grass by itself, same age,	75	–	–	1
9. Meadow, irrigated and carefully managed,	1,798	1,702	96	–

These plants in each instance were counted with the utmost care by a farmer now living in this State, then in the employ of Mr. Sinclair, and the correctness of his results may be relied on.

Now it is a well known fact that the sward of a rich old pasture is closely packed, filled up, or interwoven with plants and no vacant spaces occur. Yet, in a closely crowded turf of such a pasture, only one thousand distinctly rooted plants were found on a square foot, and these were made up of twenty different species. The soil should be supplied with a proper number of plants, else a loss of labor, time and space will be incurred; but however heavily seeded a piece may be with one or two favorite grasses, small vacant spaces will occur, which, though they may not seem important in themselves, when taken in the aggregate, will be found to diminish very considerably the yield of an acre, even if they are so small as not to be perceived. And undoubtedly some allowance should be made for the seeds and young plants destroyed by insects, birds and various accidental causes: but even after all deductions for these, we see that in this State, at least, there is no deficiency in the quantities of seed used, and the imperfectly covered ground cannot be explained in this way.

The above table is also important as an illustration of the truth of my general proposition. It shows that in those pastures where few species were found together, whether in old, natural pastures or in artificial meadows, the number of plants on a given space was proportionably small. Sinclair, too, who had observed carefully and extensively, writes on this point in regard to the practice of overseeding, as follows: "When an excess of grass seed is sown, the seeds, in general, all vegetate, but the plants make little, if any progress, until from the want of nourishment to the roots, and the confined space for the growth of the foliage, a certain number decay, and give the requisite room to the proper number of plants; and that will be according as there are a greater or less variety of different species of grasses combined in the sward."

It is proper to make some allowance for bad seed, it is true, but our practice is defective and uneconomical. In the examination of the rich and productive pasture turf, from twelve to twenty species were found closely mixed together, and there were six or seven plants to the square inch. We sow seed

enough, frequently, for fifteen plants to the inch, but rarely obtain above two or three, and very frequently even less than that.

The difficulty of procuring the seed, and its expense, have been the strongest objections to the use of many species. A demand for these species, however, would soon remove this difficulty, and varieties would be kept for sale in Boston at a reasonable price. When it is considered that the additional expense of sowing a field or permanent pasture with a greater number of species will be, comparatively, very small, while the additional yield will be proportionably large,—if the result is as favorable as the opinion of many who have made the trial would lead us to expect,—every farmer must admit that it is for his interest to try the experiment, on a small scale, at least.

It will be evident, after a moment's reflection, that very different mixtures, both as regards the species and the relative quantities of each, will be desirable for different soils; that dissimilar mixtures would be required for alternate cropping or laying down land for only a year or two, and for permanent pasture. In our pratice it is most common to seed down for some years, and not unfrequently this is done with the design of cutting the grass for hay for a few years and then pasturing the field, in which case our seeding down assumes the character of laying down for permanent pasturage. Equally good, but very different mixtures might be made, also, for the same soils by different individuals who had different objects in view, some desiring a very early crop, some wishing to select species which resist the access of profitless weeds, and others to cultivate those varieties which exhaust the soil the least. Each of these mixtures may be best adapted to the specific object of the farmer who makes it, and if composed of a sufficient number of species, may be good and truly economical.

The practice with many in New England has already been alluded to as consisting usually of one bushel, or twelve pounds of redtop, a half a bushel, or twenty-two pounds of Timothy, and from four to six or eight pounds of clover. The practice of good farmers varies but little from this mixture.

The following tables are recommended by Lawson & Son, of Edinburgh. Only a few of the mixtures have been sufficiently tried in this country, and they may need some modification to meet the exigencies of our severe droughts. It may be proper

to remark here that the climate of Scotland, in some respects, does not differ much from our own. The latitude of Edinburgh is 55° 57′, that of Boston, 42° 21′; while the mean annual temperature of the former is 47°.1 Fahr., that of the latter, 48°.9, showing a very slight difference. But our summers are hotter, and we are annually liable to the most severe and parching droughts, such as are not often felt in Scotland.

The quantities are stated in pounds. If any one is desirous of reducing them to measures he may easily do so by the use of table XIV., which gives the weight per bushel of each species.

TABLE XVI. *For Permanent Pasture.*

Meadow Foxtail,	2 pounds.
Orchard Grass,	6
Hard Fescue,	2
Tall Fescue,	2
Meadow Fescue,	2
Italian Rye Grass,	6
Perennial Rye Grass,	6
Timothy,	4
Redtop,	2
Rough-stalked Meadow Grass,	3
Red Clover,	2
Perennial Clover,	3
White Clover,	5—45

Here we have a considerable number of species, and according to table XIV., over 45,500,000 seeds. Thus, though we use less than half as many seeds as our farmers generally do, we still allow more than seven seeds to the square inch, or over 1,000 seeds to the square foot, a number larger than the number of plants found in the rich and closely woven sward of an old pasture, as seen in table XV. These, it will be seen, even if we make a large allowance for bad seeds, will produce as many

plants as will grow well, while we still have by far the largest number of stalks of redtop from no less than 3,600,000 seeds, though the weight of the redtop seed is but two pounds. This mixture is designed for one acre sown without grain in the fall.

A mixture like the above would answer very well, and is less expensive than the following, though it is probable that the greater original outlay for the seeds recommended in the following table will be more than returned in the additional yield.

TABLE XVII. *For Permanent Pasture.*

Meadow Foxtail,	2 pounds.
Orchard Grass,	4
Hard Fescue,	2
Tall Fescue,	2
Meadow Fescue,	2
Redtop,	2
June Grass,	2
Italian Rye Grass,	6
Perennial Rye Grass,	8
Timothy,	3
Wood Meadow Grass,	2
Rough-stalked Meadow Grass,	2
Yellow Oat Grass,	1
Perennial Clover,	2
White Clover,	5—45

If the cultivator desires to produce a close, matted sward as soon as possible, no broad-leaved clover should be used, and the above mixture will be quite sufficient without the perennial clover.

If the object be to make a permanent lawn, as is frequently desirable around or in sight of the farm house, something like the following mixture will be found to be on the whole the best.

TABLE XVIII. *Permanent Lawn Grasses in Mixture.*

Meadow Foxtail,	1 pound.
Sweet-scented Vernal Grass,	1
Redtop,	2
Hard Fescue,	3
Sheep's Fescue,	1
Meadow Fescue,	4
Red Fescue,	2
Italian Rye Grass,	6
Perennial Rye Grass,	8
Timothy,	1
June, or Common Spear Grass,	2
Rough-stalked Meadow Grass,	2
Yellow Oat Grass,	1
Perennial Clover,	2
Red Clover,	2
White Clover,	6—44

This mixture will resist the effects of our severe droughts better than those commonly used for lawns. If any thing is omitted from it, the red and perennial clovers, the yellow oat grass and a part of the rye grass could best be spared.

If the farmer wishes to seed down for only a year or two and then to break up again, the following is a good mixture. [Table XIX.]

If the soil be moist or peaty two or three pounds of fowl meadow, (*poa serotina*,) should be added. Some would prefer another mixture for permanent lawn pastures, as found in table XX.

If a fine lawn is wanted where extra attention will be paid to rolling and mowing, the mixture given in table XXI. will do well.

A mixture is often wanted for orchards or shaded fields similar to that recommended in table XXII.

TABLE XIX. *Mixture for Mowing in the Rotation.*

NAME OF GRASS.	For one year's hay.	For one year's hay and one year's pasture.	For one year's hay, and two year's pasture.
Redtop,	3	3	3
Italian Rye Grass,	6	6	6
Perennial Rye Grass,	3	3	3
Orchard Grass,	4	6	6
Timothy,	11	9	9
Red Clover,	8	4	2
Perennial Clover,	–	2	4
White Clover,	2	4	4
	37	37	37

TABLE XX. *Permanent Lawn Pastures.*

Meadow Foxtail,	1 pound.
Sweet-scented Vernal Grass,	1
Orchard Grass,	3
Hard Fescue,	2
Sheep's Fescue,	2
Meadow Fescue,	2
Italian Rye Grass,	6
Perennial Rye Grass,	4
Timothy,	7
Redtop,	3
Rough-stalked Meadow Grass,	3
Yellow Oat Grass,	1
Red Clover,	2
Perennial Red Clover,	2
White Clover,	4—43

TABLE XXI. *Fine Lawns frequently Mown.*

Crested Dog's-tail,	10 pounds.
Hard Fescue,	4
Slender-leaf Sheep's Fescue,	2
Perennial Rye Grass,	10
Wood Meadow Grass,	2
Rough-stalked Meadow Grass,	1
Yellow Oat Grass,	1
June Grass,	8
White Clover,	8—46

TABLE XXII. *Hay and Pasture in Orchards and Shaded Places.*

Sweet-scented Vernal Grass,	1 pound.
Orchard Grass,	6
Hard Fescue,	2
Tall Fescue,	2
Italian Rye Grass,	4
Perennial Rye Grass,	4
Timothy,	6
Wood Meadow Grass,	4
Rough-stalked Meadow Grass,	2
June Grass,	4
Perennial Red Clover,	3
White Clover,	4—42

For very sandy, dry pastures and heathy moors, the following. [Table XXIII.]

For reclaimed swamps, after draining, designed to be kept in grass for hay, the mixture stated in table XXIV. is good.

TABLE XXIII. *Mixture for Mowing on Light Sands.*

Tall Meadow Oat Grass,	3 pounds.
Orchard Grass,	4
Hard Fescue,	6
Meadow Soft Grass,	3
Italian Rye Grass,	4
Perennial Rye Grass,	10
Timothy,	3
Perennial Red Clover,	3
White Clover,	4—10

TABLE XXIV. *Mixture for Reclaimed Peaty Lands.*

Whitetop, variety called Fiorin,	2 pounds.
Redtop,	2
Meadow Foxtail,	2
Fowl Meadow,	4
Italian Rye Grass,	4
Perennial Rye Grass,	5
Reed Canary Grass,	4
Timothy,	10
Rough-stalked Meadow Grass,	3
White Clover,	4—10

If a reclaimed meadow is subject to occasional overflows of fresh water, the addition of two or three pounds of the manna grass, (*glyceria fluitans,*) if it can be had, will be an improvement. On such soils Fiorin, a variety of whitetop, does remarkably well, and the rough stalked meadow is indispensable. A mixture especially adapted to such situations would be something like the following:—

TABLE XXV. *Marshy Grounds, liable to be occasionally overflowed with fresh water.*

NAME OF GRASS.	Peaty Soils.	Alluvial Soils.
Fiorin,	4 pounds.	3 pounds.
Tall Fescue,	3	4
Manna Grass,	5	5
Reed Canary Grass,	3	4
Timothy,	4	4
Rough-stalked Meadow Grass,	4	3
Fowl Meadow Grass,	6	5
White Clover,	3—32	4—32

If it be desired to cover rocky and gravelly hills and soils of a very poor quality with grass, the mixture in the following table will be most serviceable.

TABLE XXVI. *Mixture for Rocky Hills.*

Redtop,	2 pounds.
Tall Oat,	2
Crested Dog's-tail,	3
Orchard Grass,	3
Red Fescue,	4
Meadow Soft Grass,	2
Perennial Rye Grass,	6
Timothy,	6
Wood Meadow Grass,	3
Common Spear Grass,	2
Rough-stalked Meadow,	2
White Clover,	8—43

If the soil be very dry, the wood meadow grass and the Timothy may be omitted from the above mixture, and a larger quantity of June grass used. The following mixture is well adapted to dry, gravelly soils, which are difficult to turf over.

TABLE XXVII. *Mixture for Dry Gravels.*

Redtop,	3 pounds.
Tall Oat Grass,	8
Red Fescue,	4
Meadow Soft Grass,	4
Soft Brome Grass,	4
Perennial Rye Grass,	5
June Grass,	4
White Clover,	4—36

For protecting banks of rivers and streams from washing and wearing away, the reed canary grass and the reed meadow grass will be found very effectual. For preventing the drifting of light sand, beach grass, (*ammophila arundinacea*,) is one of the best. It is extensively used for this purpose at Provincetown and various other places along the coast. I have sown the seeds of other species in such situations, but know of none equal to beach grass for the purpose of fixing moving sands.

As already seen, the general practice in New England is in strong contrast with the foregoing tables of mixtures, for of the two hundred towns heard from, all appear to raise the same species, but no two recommend the same quantities for mixture, and not one reports the use of more than two species of grass mixed with one or sometimes two species of clover, as at all common.

As examples of the general practice as reported to me, and with which I have been familiar for many years, the following might be stated.

I. ½ bushel (6 lbs.) redtop, 1 peck (11 lbs.) Timothy, 5 lbs. red clover.

II. 1 bushel (12 lbs.) redtop, 1 peck Timothy, 8 lbs. red clover.

III. 1½ bushels (18 lbs.) redtop, 4 qts. (5½ lbs.) Timothy, 3 lbs. red clover.

IV. 3 pecks (9 lbs.) redtop, 6 quarts Timothy, 6 lbs. clover.
V. 1 bushel (12 lbs.) redtop, 1 bushel (44 lbs.) Tim'y, 10 to 15 lbs. clover.
VI. 1 peck (3 lbs.) redtop, 1 peck (11 lbs.) Timothy, 8 lbs. clover.
VII. 4 quarts (1½ lbs.) redtop, 1 peck (11 lbs.) Timothy, 2 quarts red clover, 1 pint white clover.
VIII. 16 quarts, (6 lbs.) redtop, 12 q'ts (16½ lbs.) Timothy, 6 lbs. clover.
IX. 12 quarts (16½ lbs.) Timothy, 4 lbs. clover.
X. 1 bushel (12 lbs.) redtop, ½ bushel (22 lbs.) Timothy, 10 lbs. clover.
XI. 1 peck redtop, 3 pecks Timothy, 6 lbs. clover.
XII. 3 pecks redtop, 1 peck Timothy, 5 lbs. clover.
XIII. 1 bushel finetop, 1 peck Timothy, 8 lbs. clover.
XIV. 1 bushel redtop, 1 peck Timothy, 12 lbs. clover.
XV. 16 quarts redtop, 10 quarts Timothy, 6 lbs. clover.
XVI. 1 bushel redtop, ½ bushel Timothy, 10 lbs. clover.
XVII. 5 pecks redtop, ½ bushel Timothy, 4 lbs. clover.
XVIII. 1 bushel redtop, 1 peck Timothy, 8 lbs. clover.
XIX. 1 peck redtop, 1 peck Timothy, 10 lbs. clover.
XX. 3 pecks redtop, 8 to 10 quarts Timothy, 6 to 8 lbs. clover.

These mixtures are sufficient to show the exceeding diversity in our practice.

A little attention to the weight of the different seeds recommended in the above tables will explain why one particular quantity which may appear small at first sight, is sufficient in some cases, as it will show a vast difference in their weight; a given number of pounds of some species containing many more seeds, and therefore producing a far larger number of plants, than an equal weight of others.

There are few points in our practice, it seems to me, where greater improvements could be made than in the selection and mixture of our grass seeds. If the money which is now literally thrown away by over-seeding with one or two species were expended in procuring other species and improving our mixtures, there is but little doubt that the aggregate profit on our grass crop would be much greater than it now is.

Some maintain that one or two species are sufficient, because certain grasses are "natural," as they say, to their land, and come in of themselves. This may, in some cases, be true to some extent, for such grasses will come in, in time, but we are

liable to lose sight of the fact that the loss of a full yield, in the meantime, is often very serious.

But the inference which farmers draw from this fact is not a legitimate one, for they say that it proves that the grasses that come in "naturally," that is, the wild grasses, are best adapted to the soil, and will produce more largely than others in that locality. But this, if carried out to its natural consequences, would lead to the conclusion that new species of plants should never be introduced into any soil, because those best suited to it grow there "naturally"—a principle which no man will assert. On the contrary, one great object of all intelligent farming is to improve upon nature, and to increase the natural capacities both of the soil and of the plants which grow on it; and the introduction of new species and varieties is one of the most effectual means of accomplishing this end. Particular species of plants do not always spring up in particular places because they are peculiarly adapted to the soil, but often from mere accident. Seeds are carried by the wind or by animals or birds, and being dropped, produce plants on the spot where they fall. These plants again produce seeds which fall and in their turn produce other plants. Thus a particular species of grass or any plant may be introduced into, and fixed in a locality where it has no special adaptation to the soil there, and the most common plants or varieties of plants will be most likely to spread in this way. Hence the mere fact that a certain species is very generally diffused in a certain district, does not by any means prove that it is better suited to the soil of that district than any other species, nor that it will be sure to come in if omitted in a mixture of grasses designed for such a locality.

As already said, the mixture of grass seeds in imitation of nature for the purpose of forming good permanent fields or pastures, is of comparatively modern origin. It was, for a long time after this practice commenced, thought to require a great while to form a thick and good sward or turf, by any artificial means. The use of a large and judiciously selected number of species, has been found to accomplish this object most quickly.

Though I have expressed myself with some degree of confidence on this subject, I would still refer to the importance of careful experiment. The outlay is small, when compared with the losses now sustained in over-seeding with too few

species, and from small or medium crops; and the farmer can soon satisfy himself as to the profit of more attention to the mixtures of grasses.

TIME TO CUT GRASS FOR HAY.

Having carefully selected and judiciously mixed and sown his grass seed at a proper season, the farmer may confidently hope to have an abundant crop of grass the following year, when there will naturally arise one of the most important questions in the economy of the farm, and that is, when to cut grass to make into hay, or at what stage of its growth it is most valuable for that purpose. This is a point on which even experienced farmers differ, but the weight of authority will be found strongly for cutting at the time of flowering. Most practical farmers, in answer to this question say that hay is sweeter, and possesses more nutriment when cut in full blossom than at any other stage. One of the most intelligent farmers of Middlesex county says: "I prefer to cut grass when in blossom, because it will make more milk and more fat, and cattle prefer it to that standing later. It keeps them loose and healthy. I have no doubt hay of the same bulk weighs more if it stands in the field till the seed forms, and for this reason some who sell most of their hay let it stand." A farmer of Worcester county says: "When designed for milch cows, store, or fattening animals, I prefer to cut in the blossom, because it makes more milk, more growth and more beef. For working cattle and horses I cut about six days after the pollen has fallen, because it does not scour or loosen the animal so much as when cut in the blossom." A farmer of Hampshire county says: "Next to sweet, fresh grass, we think that rowen will make cows, working cattle or horses thrive better than any other feed, unless in the case of cattle hard at work. We conclude, therefore, that all hay is best cut early. Coarse hay will keep stock tolerably well, cut early, which if allowed to mature would not be eaten at all." A farmer of Hampden county says: "We cut after the blossoms begin to fall, and before they have all fallen. It has more substance and weight cut at that time than if cut sooner, more sweetness and juice than if cut later." A farmer of Berkshire county says: "Our rule is to cut hay in the blossom, as it is then in the best state for feeding, less woody and

much sweeter than later, and leaves the roots in better state for a second, or another annual crop." Another very intelligent, practical farmer says: "We cut in blossom, because it is then most palatable to stock. If allowed to stand much longer there is a draft upon the soil for the growth of the seed, which is not repaid by the additional value of the hay, if, indeed, it is increased in value at all. My opinion, derived from my own experience, is, that the grasses will sooner die out if allowed to stand later." A farmer who prefers to cut all other grasses when in blossom, says: "It will not do to cut blue joint or fowl meadow till some of the seeds fall, as it will soon run them out." An intelligent farmer of Norfolk county says: "When English grass is in full blossom it has all the good qualities it can have. From that time I think it loses in value in proportion to the time which it stands. Swale hay should be cut rather green. If fully ripe it is hard and dry." Another says: "We cut about the time the blossom falls. The grass is then at its full growth. If it stands much longer the leaves begin to die at the bottom and the grass grows tough and hard, and I think the longer it stands the less it will weigh when dried. If it is cut much earlier it will shrink and dry up and does not seem to have so much nutriment in it, and I have noticed cattle will eat more in bulk than when cut at the right time." Another says: "The time of cutting depends very much upon the use you wish to make of it. If for working oxen and horses, I would let it stand till a little out of the blossom, but if to feed out to new milch cows in the winter, I would prefer to cut it very green. It is then worth for the making of milk in the winter, almost double that cut later." One other extract will suffice. A farmer of Middlesex county says: "I cut my red clover before the heads begin to turn brown. When the clover is quite heavy I cut it when only one-half the heads have blossomed, because then cattle will eat all the stems. Clover is injured more by half when it stands long after blossoming than any other kind. I find my clover hay in the barn much heavier when cut quite early."

These extracts, taken at random from a large number of letters from practical farmers all over the State, indicate very clearly the prevailing practice. The replies from about one hundred and fifty towns are, that farmers prefer to cut the

principal grasses, Timothy and redtop, when in full blossom; red clover when about half the heads are in blossom, and swale grass before it is ripe, and generally before blossoming, if possible, so as to prevent it from becoming hard and wiry.

This practice is unquestionably founded on a correct principle, the object of the farmer being to secure his hay so as to make it most like grass in its perfect condition. From principles stated in another place, it has been seen that the nutritive substances of grass are those, which are, for the most part, soluble in water, such as sugar, gluten, and other compounds. Now it is evident that if this is so, the grass should be cut at the time when it contains the largest amount of these principles. In its early stages of growth it contains a very large percentage of water. From its earliest growth the sugar and other soluble substances gradually increase till they reach their maximum percentage in the blossom, or when the seed is fully formed in the cell. From this period the saccharine matter constantly diminishes, and the woody fibre, perfectly insoluble in water, and innutritious, increases till after the seeds have matured, when the plant begins to decay. Of course, if the plant is not cut in the flower, a great part of the nutriment of its stems and leaves is wasted.

There are some exceptions to this rule in the natural grasses, as already seen in considering their nutritive qualities, and in the analyses at different periods of their growth. Thus, in case of the orchard grass, Sinclair found the nutritive matter at the time the seed was ripe and at the time of flowering, as seven to five, and the stems of Timothy were found to contain more nutritive matter when the plant was ripe, than at the time of flowering, though it was found that the loss of aftermath which would have formed had the plant been cut in blossom, more than balanced the gain of nutritive matter in the ripening of the seed. Most of the grasses, too, make a greater quantity of hay when cut at the time of blossoming, though the crested dog's tail has been found to be an exception to this rule. Fowl meadow, also, contains an equal quantity of produce at the time of ripening the seed and at the time of blossoming, and the nutritive matter at both periods is about the same. It will be found in practice generally to be better to be a little too early than too late, for the gain is in two directions, in

a greater nutritive substance at the time of blossoming, which is certainly a sufficient consideration of itself, and in the larger growth of the lattermath which will spring up on good land and in a good season.

We might also reason from analogy in other plants, for it is a well known fact that the best vegetable extracts for medicinal and other purposes, are procured from plants when in blossom. Prof. Kirtland, of Ohio, states that an observing, practical farmer of his neighborhood, after many careful observations on the growth of Timothy, has arrived at these propositions:—

1. That Timothy grass is a perennial plant, which renews itself by an annual formation of "bulbs," or perhaps, more correctly speaking, tubers, in which the vitality of the plant is concentrated during the winter. These form in whatever locality the plant is selected, without reference to dryness or moisture. From these proceed the stalks which support the leaves and head, and from the same source spread out the numerous fibres forming the true roots.

2. To insure a perfect development of tubers, a certain amount of nutrition must be assimilated in the leaves, and returned to the base of the plant, through the stalk.

3. As soon as the process of nutrition is completed, it becomes manifest by the appearance of a state of desiccation, or dryness, always commencing at a point directly above either the first or second joint of the stem near the crown of the tuber. From this point the desiccation gradually progresses upwards, and the last portion of the stalk that yields up its freshness is that adjoining the head. Coincident with the beginning of this process, is the full development of the seeds, and with its progress they mature. Its earliest appearance is evidence that both the tubers and seeds have received their requisite supplies of nutrition, and that neither the stalk nor the leaves are longer necessary to aid them in completing their maturity. A similar process occurs in the union just above the crown of the bulb, indicating the maturity of that organ. Fig. 97 represents the bulb fully developed and mature, from which the stalk was cut, after the nutritive process was completed, above the point where drying or desiccation had begun.

4. If the stalk be cut from the tubers before this evidence of maturity has appeared, the necessary supplies of nutrition will

be arrested, their proper growth will cease, and an effort will be made to repair the injury by sending out small, lateral tubers, from which weak and unhealthy stalks will proceed, at the expense of the original tubers. This is seen in Fig. 98. All will ultimately perish either by the droughts of autumn or the cold of winter.

Fig. 98.

Fig. 97.

Fig. 99.

5. The tubers, together with one or two of the lower joints of the stalk, remain fresh and green during the winter, if left to take their natural course, but if, by any means, this green portion be severed, at any season of the year, the result will be the death of the plant, when it will appear as in Fig. 99.

From these five propositions the following conclusions are drawn:—

1. That Timothy grass cannot, under any circumstances, be adapted for pasture; as the close nipping of horses and sheep is fatal to the tubers which are also extensively destroyed by swine if allowed to run in the pasture.

2. That the proper time for mowing Timothy is at any time after the process of desiccation has commenced on the stalk, as noted in the third proposition. It is not very essential whether it is performed a week earlier or later, provided it be postponed till that evidence of maturity has become manifest.

3. All attempts at close shaving the sward should be avoided, while using the scythe, and in gauging mowing machines, care should be taken to run them so high that they will not cut the Timothy below the second joint above the tuber.

I have frequently, during the past autumn, pulled up the bulbous roots of Timothy, from the stubble from which a heavy crop had been cut with the scythe, while in flower, for the purpose of studying the changes which were taking place in these tubers, and have found them very similar to those represented in Figs. 97 and 98, not only on moist, damp soils, but also on soils comparatively dry. Any farmer can satisfy himself of the correctness of these representations by a little observation in his own fields; and as the point is of practical importance, it is worthy of careful attention.

The facts above alluded to have fallen under the observation of a practical farmer of Middlesex county, who says: "The proper time to cut Herds-grass or Timothy, is after the seed is formed and is full in the milk. It will then give about twenty per cent. more weight than when it is just coming into the blossom, and the cattle will eat twenty per cent. less and keep on their flesh. And I prefer also to cut it at that stage of its growth on account of the roots being better able to withstand the drought. It should be cut four inches from the ground, as most of the Timothy is killed by mowing close and early before it has come to maturity. I have kept Timothy thick and strong in the land six years, by following this method. I have noticed that most of it has died out by once or twice close and early mowing before the grass has come to maturity; if it is dry weather it is sure to die when so cut. I lost a whole

field of it by mowing too close and early, and I consider the four inches at the bottom of coarse Timothy of little value."

If the seed is allowed to ripen it exhausts the soil far more than if cut in the blossom.

MOWING MACHINES.

We now come to the methods of cutting grass. As this crop is one of the most important and valuable in the whole range of farming products, any practicable means offered to facilitate its harvesting in the best manner, and at the least expense, will naturally excite the interest of the progressive farmer. The ordinary method of cutting by the hand scythe is already too familiar to every one in New England to need a moment's notice in this connection, and I propose only to allude to a comparatively new method of mowing by horse or ox power, and chiefly to the success which has attended the use of machinery during the past season as indicated in the returns to the circular already given, and in reply to the second question, "Have you used a mowing machine, if so, what patent, with what power, and with what advantage?"

The inducements held out by the Massachusetts Society for the Promotion of Agriculture, by an offer of a premium of $300, in the year 1855, to the one who should make the most successful experiments in cutting grass by machinery, and of $1,000, to be awarded in 1856, to the inventor or manufacturer of the best mowing machine, very naturally led our farmers to hesitate in procuring machines till the results of these trials were known. The number of affirmative answers to the above question was, notwithstanding, very considerable, and generally wherever used, the testimony is strongly in favor of the use of machinery.

In speaking on this subject I shall state simply the facts which have been returned to me by practical farmers, without expressing any personal preferences for any particular patent. By so doing, I shall give the farmer who designs to purchase a machine the means of forming his own judgment without the necessity of any bias from mine. I will simply state that my observation of these machines and their work has been extensive during the two past seasons, and that the improvements

during that time have been very great in nearly all the patents which have fallen under my notice.

A practical and experienced farmer of Hampden county, in answer to the circular says: "I use Manny's Patent Mower, manufactured in Worcester, by J. P. Adriance & Co., and have cut more than one hundred acres in the two last seasons, without breaking a tooth or the point of a knife. The whole expense of repairs has not exceeded three dollars, and it is now in fine order for years to come. The power is the same as common ploughing. If the horses are permitted to stop but a short time, and that often, in hot weather, as when ploughing, I would as soon let my horses mow a day as plough."

A farmer of Worcester county says: "I have used Ketchum's and Manny's mowing machines. I prefer Manny's to Ketchum's. It draws much easier, and is easier to manage. I worked them both with the same horses. My mowing lots are small. Farmers with large lots can use the machine to greater advantage than I can, but on my small lots it saves nearly two-thirds the cost of mowing, and all the cost of spreading." Another in the same county says: "In July, 1854, I used Ketchum's Patent Mower, with which, after many failures and repeated discouragements, I succeeded in cutting the crop of grass, and made considerable saving in the cost of getting the crop, but was of the opinion that great improvements were necessary. In 1855 I used the same patent altered, but not improved, by an iron frame and cutter bar. The present season I have used the Manny patent, manufactured in Worcester, and can say that it is a labor-saving machine for the farmer. The Manny is far superior to the Ketchum, for lightness of draught and the slowness of speed required in uneven places; the lever by which the cutter bar is raised or lowered at pleasure,—the perfect arrangement of the knives that could not be clogged or stopped in more than fifty acres,—the convenience of transporting it on its own wheels from one lot to another, and last, not least, combining, as it does, the reaper, renders it one of the most perfect machines that has come under my notice. In regard to the profit of mowing by machinery, it has cost to secure the hay on this place, on an average, about $100 a year for extra labor. This year but $34, allowing nothing for the labor of horses."

A practical farmer of Berkshire county says: "I have used

Manny's combined machine for the two past seasons, having cut all my hay and grain with two horses. The first great advantage is that I cut my hay on the day it is *fit* for cutting; second, I get more hay, as it is all cut up alike—no pointing out to be seen when the snow is a foot deep—and third, it don't make a

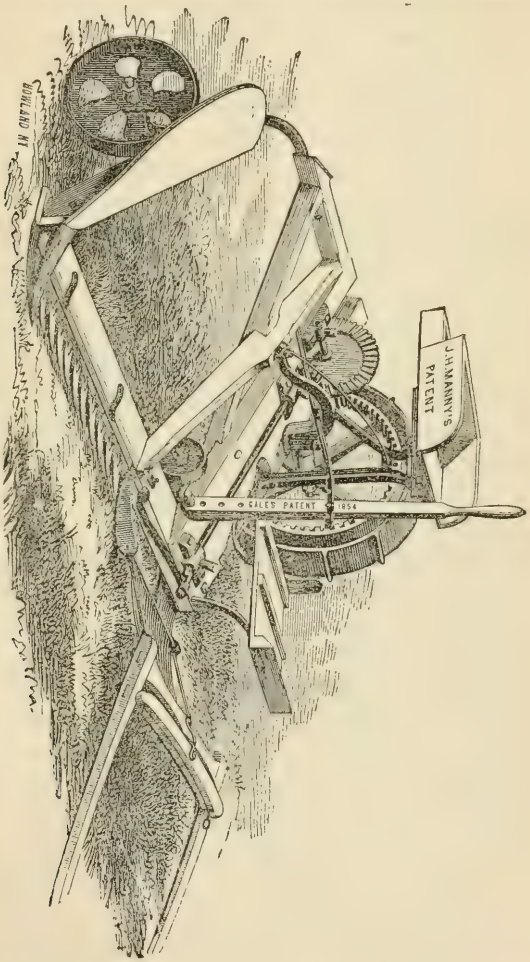


Fig. 100. Manny's Mower.

public house of my home during haying and harvesting, for day laborers. The common farm hands with a Manny machine will do the haying with all ease, and at half the expense." Another in Franklin county says: "I have used Ketchum's patent with two horses, for three seasons. Think I save from the

expense of mowing and spreading by hand, together with the advantage derived from being able to cut all I wish to after the dew is off, one dollar per ton." An experienced farmer of Norfolk county says: "I have used Allen's patent, moved by horse-power, with great advantage. Horses move slowly, as in ploughing—are less fatigued than by ploughing all day. I have mowed twelve acres per day, and can mow easily and smoothly any grass, even heavy and lodged clover, and on any surface where a scythe can be used. I regard it as of great use, saving much time and hard labor. It cuts clean and smooth, spreads the grass evenly, and requires only the labor of one man in the largest field, until the grass needs to be turned or raked up." Another in Hampshire county says: "We have used a mowing machine for the four last seasons, of Ketchum's patent. There are ten others of the same patent, and three of other kinds in town, all of which are in active use. They are all worked with horses, two on each. As to the advantage gained by the use of the mowing machine, I hardly know what to say or how to reckon it. There are a number of points to be considered, some of which would be called an advantage by some, which with others might not be so considered. But, the gain in cutting the grass must be apparent to all who have land smooth enough to work a machine on; and in this connection it may be best to speak of the horse-rake with the mower, as one naturally follows the other. Our way of getting hay when the weather is good, is this: To cut and rake it into the windrow the first day. The next, open and turn it, if necessary, then rake it and cart it.

Now one man with a machine and horses, in the forenoon, and one horse and rake three hours after dinner, can put five or six acres of grass into the windrow every day if he chooses, which is as much as ordinary farmers in this vicinity wish to do, as our hay has to be carted from one to two miles, and that takes time. How many men will it take to do the same work? Any one can answer this to his own satisfaction, and as labor differs in price in almost every section of the State, the actual cost would vary somewhat. But here it would take from five to ten men to do the same work, varying as the burden of grass does per acre; for in lodged grass ten would hardly do.

"Then the advantage of having it done in good weather and cutting the grass when he chooses, whether in blossom or after

it is fully ripe; I think this can be safely put down at ten per cent., and some call it as high as twenty per cent." A farmer in another town in the same county says: "Have not used any. There are a number of machines in the town. Allen's patent has done the best work this season. Ketchum's improved machine does pretty well. I think they are coming into use more and more."

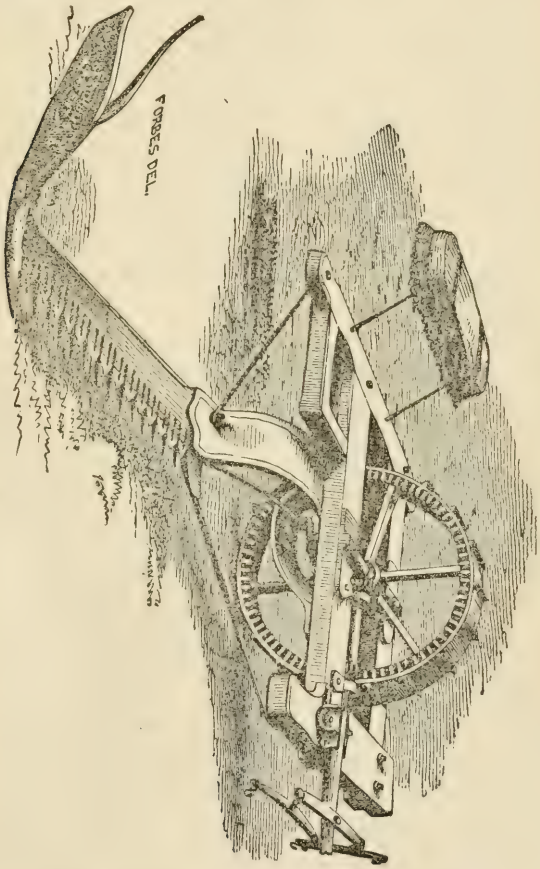


Fig. 101. Ketchum's Mower.

The following extract is from the statement of Dr. Loring, made to the Essex Society during the past season.

"The ground upon which my machine (Ketchum's) was operated, furnished a very severe test of its power. Most part of it is clayey, heavy soil, very wet in wet seasons and stiff and rough in dry ones. No special care has been taken in laying it

down. And I am confident that no machine but the strongest, could endure the wear and tear to which it is subjected on such a surface.

"No difficulty has been experienced in the varieties of grass which I have cut. The heaviest and the lightest have fallen equally well, and no trouble has been met in turning the corners or in driving the machine so as to avoid clogging.

"The experience of this season has convinced me that on ordinary, rough New England farms, the Ketchum machine works almost to perfection. I do not mean to say it has no equal, for I have not experience to warrant such a statement. But in all varieties of work, light grass and heavy, lodged clover and upright Timothy, rough land and smooth, I find that I can rely on its operations, without particular effort to secure for it any advantages. Its draught is no trouble to such horses as a farmer ought to own. And it does its work without any extra and ingenious appliances.

"Of the economy of mowing machines, it seems to me there can be no question. I have found that the machine operated on the Pickman farm would cut grass enough in four or five hours in the morning to keep the laborers busy during the day, and as much as could be cured and got in with ease. The two seasons during which I have witnessed the working of the machine, I have made it, in my mind, an absolute necessity, in all economical management of the farm, to which purpose alone I have had it applied."

But the great trial in this State the past year, was in competition for the premium of $1,000 already alluded to, for the best mowing machine. Three farmers of well known good judgment were appointed to act as a committee. They gave all the machines entered a very thorough and careful examination, saw the work of each, and made a report which has been returned to me in manuscript, and will shortly be published in full. In this report, after speaking of several machines, which, after a preliminary examination or trial, were ruled out for palpable defects, they say:—

The four other machines were tried upon another lot of grass, on patches of equal dimensions, each in succession, both when the grass was wet and dry. This was a heavy crop of clover, Timothy and

redtop mixed, some of which was lodged. Portions of the lot were rolling, and the surface generally quite as far from level as our ordinary grass fields, so that upon the whole, it was an excellent lot to test the machines.

They were also tried on a meadow bottom which had never been ploughed, where various wild grasses, both coarse and fine, were intermixed.

The trial, you will thus perceive, was a thorough one, and by it we were able to form a satisfactory judgment of the merits of the different machines. The remaining machines, and between which we were to judge, were patented or known as Ketchum's, Manny's, Heath's and the Allen machine, entered by R. L. Allen. The owners of the Ketchum machine allege that Mr. Allen has infringed upon their patent, and has no right to build or sell his machine except within the limits prescribed in a license procured from them, and that Massachusetts is not within those limits. However that may be, is of no consequence so far as our report is concerned, for we did not regard the consideration of that question as within our province, and it therefore had no weight with us. The Ketchum machine, entered by Nourse, Mason & Co., has probably been in use longer in this State and is more generally known than either of the others. The one which they entered for premium differs from those which have been built by them in years past, in having a driving wheel of comparatively small size, wrought iron substituted for castings wherever it was deemed practicable, and every thing about the machine so made as to reduce weight. In this they have succeeded, their machine with pole and whiffletrees attached weighing only about 460 pounds. The price of the machine has also been reduced from $100 or upwards, to $75. We think that in this, they have made no mistake, but that the reduction in weight is a great mistake. The difference in the amount of draft required to operate a machine of 400 pounds weight and another of 700 pounds weight, other things being equal, would probably be almost imperceptible, except by very accurate dynamical tests; and may it not be that the difference would then be found to be in favor of the heavier machine? Without entering into any speculation upon the matter, we think that it was a fact apparent to every careful observer that this light Ketchum machine actually required more power of draft when in operation than either of the four, and that the one which required the least power of draft was almost twice as heavy. So light, indeed, was it, that with the weight of the driver superadded, and driven at a rate of speed sufficient to cut the grass well,—which, by the way, is a little higher than that required by the

other machines,—inequalities in the surface, even slight ones, caused it to bound in such a manner as to throw up the extreme end of the finger bar several inches above its true cutting level, leaving the stubble uneven and wavy.

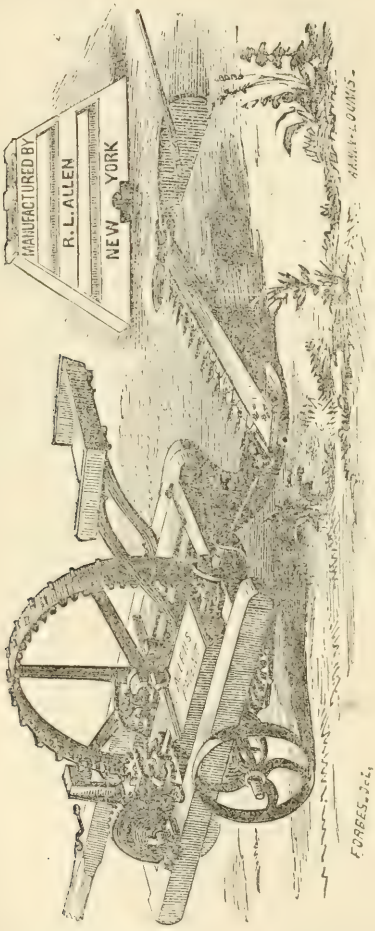


Fig. 102. Allen's Mower.

Allen's machine required less power of draft than the Ketchum machine. Its weight with pole and whiffletrees is about 600 pounds. No machine that we have seen is so readily thrown in and out of gear as is this. It has a wooden instead of an iron finger bar. In our opinion an iron finger bar is preferable. The weather cannot affect it as of necessity it must a wooden one, and the grass which falls upon it leaves it a little more readily. Outside of the driving wheel is a

light wheel which runs on a spring axle, and is claimed to be advantageous in turning and in working the machine on a side hill.

The Manny machine also requires less power of draft than did the Ketchum machine. In this respect, the difference between it and the Allen machine was almost imperceptible. It has a wheel at the end of the knife bar, which greatly assists in turning and backing, and makes it much more comfortable to transport from one field to another. We think that, other things being equal, a machine with a wheel at the end of the finger bar, has an advantage over a machine without it. Although very different in construction, we regard the Allen and the Manny machines as very nearly alike in point of merit, and if it had so happened that it was necessary for us to decide between those two machines, our judgment would have been made up cautiously and with much hesitation, for each has points of excellence which the other does not possess. Both these machines did their work generally well, but not so well as the work done by the Heath machine.

This, like the Manny machine, has a wheel at the end of the finger bar. Like that, too, it has a reel which may or may not be used, as circumstances require. But its cutting arrangement differs entirely from either of the other machines. They each have a single knife with the blades riveted to the plate and operating through cast iron fingers or guards, which, especially when the knife is dull, may be liable to get filled up and thus clog the blades. Instead of these, this machine has virtually a double set of cutters, the under set being stationary, projecting an inch beyond the upper, and thereby acting in the double capacity of guard and cutter. These, as well as the upper blades are each independent of the other, and each attached to its bar by a screw bolt. The upper set of blades is held down by a spring pressure bar, so that the operation is similar to that of shears, the grass being cut between two sharp edges, and the machine working nearly as well at one rate of speed as another. In case of accident, therefore, a blade can be removed by any body and another substituted in an instant of time. Both the upper and lower cutters are made like the best edge tools in use, of the best cast steel with wrought iron backs. The iron furnishing strength, the steel can be made as hard as desirable without so much danger of breaking by use, and being made hard do not require to be so often ground. The lower cutter or guard, as you may please to call it, is half an inch thick and one and one-fourth inches wide. The upper blades are about twice as thick as those used on any other machine. This machine very evidently required less power of draft than either of the others, and did its work the best. The Manny machine weighed about 600

pounds. This weighed about 800 pounds. In its cutting apparatus, which is perhaps the most important feature of a mowing machine, we regard it as very much superior to either of the others. In its ease of draft, perhaps the next most important feature, we regard it as

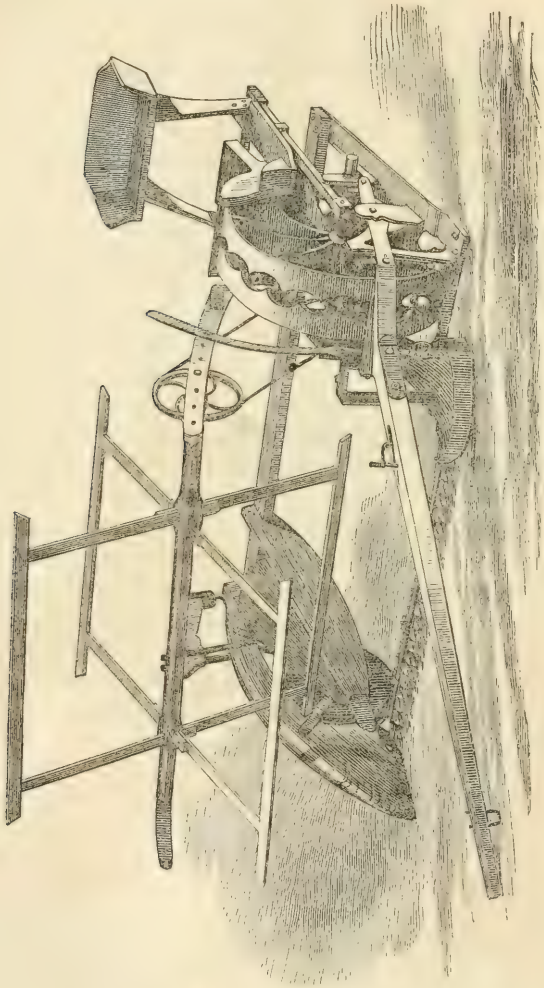


Fig. 103. Heath's Mower.

superior. We regard it also as less liable to clog than any machine with fingers or guards, like those of Ketchum, Manny and Allen. In other important features it is equal to the other machines.

We therefore unhesitatingly, confidently and unanimously express

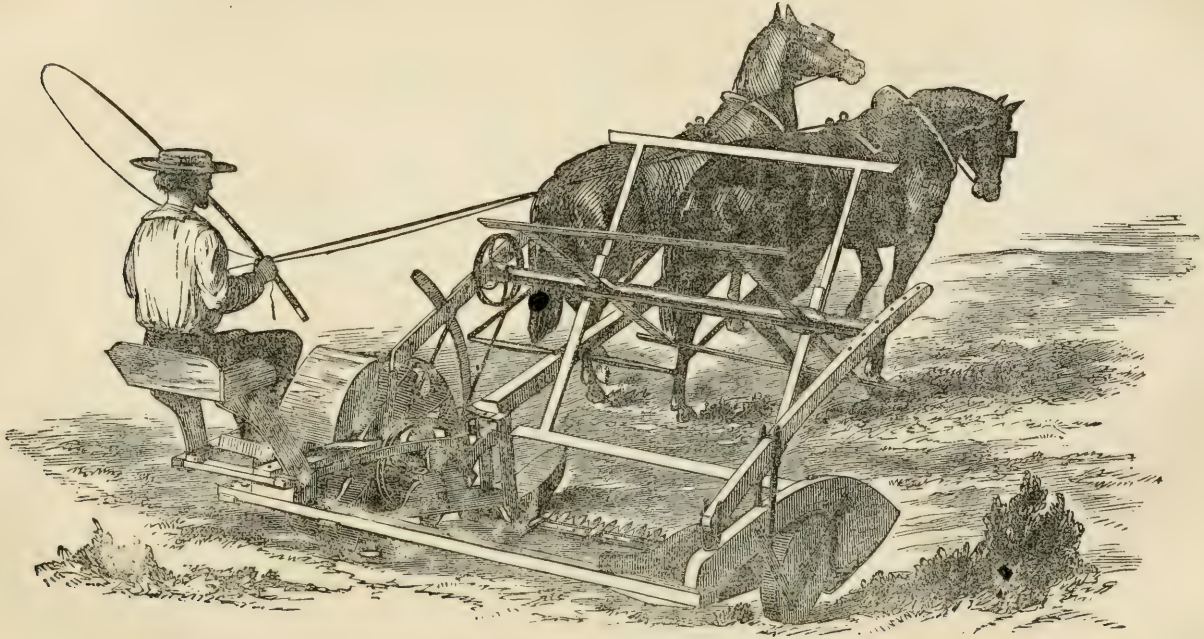


Fig. 104. Heath's Mower in operation.

the opinion, that the Heath machine, entered by D. C. Henderson, is entitled to the premium of one thousand dollars, if that premium is awarded the present year.

HEIGHT OF CUTTING GRASS.

With respect to the height from the ground at which it is best to cut grass, the practice and the opinions of farmers differ widely, for while the answers from about half of the towns say that farmers generally cut as close as possible, the replies from others vary from four inches to one-half an inch. Thus, forty-four towns return, "as close as possible;" fourteen towns, "close, or very close;" sixteen towns, "from two and a half to three inches high;" ten towns, "two inches high;" twenty-three towns, "from one to two inches;" one town, "four inches," while some say, "it might be cut too close," or "close cutting is injurious," or "most people cut too low," and many say, "close as convenient."

It would be difficult to deduce any general rule from the replies to the question, "At what height from the ground do you prefer to have your grass cut, and why?" A farmer of experience in Hampshire county says: "I should prefer to have my grass cut high enough to protect the roots from the hot sun. *I have seen Timothy grass nearly killed by cutting close in a dry, hot time.*"

An intelligent, practical farmer in Middlesex county says: "I prefer to shave pretty close, within an inch of the ground when smooth enough. I still remember some proverbial sayings of my teacher to this effect: 'An inch at the bottom is worth two at the top,' 'You are leaving your wages behind you,' &c. Possibly in very hot, dry weather, on a dry soil, some plants might be injured by a too close shaving, but I should not apprehend any harm, even then, and as a general rule I prefer to have grass cut as close as it conveniently can be." One of the most experienced, practical farmers of Plymouth county says: "Upland mowing grounds I do not like to have cut close, having an idea that the hot sun and dry weather which often follow the mowing season will have an unfavorable influence on the roots of the grass. Low and wet meadows I like to have mown close as possible. There, the heat of the sun is bene-

ficial." A very successful, practical farmer of Worcester county says: "The height from the ground at which it is best to cut grass, depends on the season, the soil and the grass. No grass, except on moist ground, should be cut so low in a very dry season, as it will do to cut it in a wet season. The natural grasses I like to have cut within about two and a half inches of the ground. Our old fields of cultivated grasses do not afford much afterfeed after the clover is run out; what of stubble is left on them is lost, so I like to mow close."

One of the most observing, experienced and practical farmers of Hampden county says: "I prefer grass cut from an inch and a half to two inches, as it starts much quicker to grow when cut at that height, than when shaved close to the earth, as some that are called good mowers do their work. If it is true that all crops are benefited from the ammonia in the atmosphere, as I have no doubt they are, judging from grass side by side, the one cut close, the other two inches high, the grasses should have some leaves left them to receive this benefit. Grass cut two inches high will keep growing, while that closely cut will be even weeks before it will show the first signs of life."

Another experienced farmer says: "Where I top-dress immediately after, I cut as low as I can, to save all the grass I can. If I do not top-dress I cut from two to three inches high, to protect and nourish the roots. I do not feed in the fall where I do not top-dress. I intend to manure all my natural upland mowing land and never feed my old fields." And another: "I like to cut rather near the ground, for the reason that more hay is obtained. If the soil is in good condition, and not too dry, it will start again immediately. I know some say cut high, the stubble will manure the land and protect the roots, &c., but I prefer to manure with something better for protection. I top-dress my mowing land and prefer a compost made of woollen waste and meadow mud for soil not very wet; but for a cold, heavy soil, should prefer sand, or sandy loam to mix with wool waste. Apply fifteen cart loads of thirty bushels each, late in autumn."

A farmer of Franklin county says: "The farmers here cut their grass as near the ground as they can conveniently, without any particular reason for it, except to increase the quantity of hay." Another says: "I prefer to have my grass cut at two

inches from the ground, where the land will admit of it. Three inches at the bottom is more valuable than six at the top; besides, it leaves the land in better shape for the next year." Another intelligent, practical farmer says: "It has been difficult to get mowers that would cut close enough, but the mowing machine gives better satisfaction in that respect." And another: "The general practice in this vicinity is, to cut as low as possible, in order to get all the fodder; unquestionably it would be better for the ground and the next crop, to cut the grass a few inches above the ground, to shield the roots, still, I consider, to cut low, followed by a top-dressing, is a better way, and leaves a smoother surface to mow over the following year."

An intelligent farmer of Berkshire county says: "Three inches. If pared too close, the hot sun kills or impairs the vigor of the roots, and stubble of some length retains the snow and gives protection from the winds of winter."

A very successful, practical farmer of Essex county says: "I prefer to cut English grass about three inches from the ground, believing that cutting it closer lets the rays of the sun to the roots of the grass, the intense heat of which, without any screen or shade, greatly impairs the growth of the plant, particularly in a dry season." Another of Middlesex, says: "Cut Timothy grass rather high; finer grasses, and especially wet meadows, should be cut as close as practicable; on upland, in fine grass, there is great loss to the crop by cutting high; in wet meadows high mowing gives the mosses and cranberries headway, which will eat out the better grasses."

Thus, the testimony on this point is somewhat conflicting; but many have noticed the injury inflicted upon Timothy by low cutting in dry weather, sufficient, perhaps, to establish the principle alluded to on a preceding page. Most concur in saying that the finer grasses can be cut lower with safety, particularly if the season be not too dry. Much, undoubtedly, depends upon the soil and the season.

CURING OF HAY.

We have seen that grasses attain their full development at the time of flowering, and then contain the highest percentage of soluble materials, such as starch, sugar and gum, and that

these, with the nitrogenous compounds, then, also, most abundant, are of greatest value as furnishing the nutriment of animals, while woody fibre and mineral matter, though important as giving bulk to the food, are insoluble and least nutritious. We have seen, also, that in the transition from the flowering to the ripening of the seed, the starch, sugar, &c., are gradually transformed into woody fibre, in which state they possess no nutritive qualities, and are, of course, of little value. This fact, which is perfectly well established by careful experiment and accurate analysis, confirmed as already seen by intelligent practice, is of great importance as indicating the condition in which most of our cultivated grasses should be cut, and our practice is pretty uniformly consistent with it.

But there is another equally instructive suggestion in these transforming processes, and it is this: If grass is cut in a condition ever so succulent, and before the transition of sugar, &c., into woody fibre has commenced, there will even then be some loss of sugar and starch from the action of heat and moisture, especially if the grass is exposed to the rain in the process of curing, and lignifaction, or change to woody fibre takes place to considerable extent, dependent, of course, on the length of time it is exposed to air and light; so that grass cured with the least exposure to the searching, sifting winds, and the scorching sunshine, is, other things being equal, more nutritious than grass cured slower and longer exposed, however fine the weather may be. In other words, grass over-cured in the process of hay making, contains more useless, woody fibre and less nutritive qualities, than grass cured more hastily and housed before being dried to a crisp. There can be no doubt which of the two would be most palatable to the animal. Some loss of nutritive elements must, therefore, take place in the process of curing, however perfect it may be, and the true art of hay-making consists in curing the grass just up to the point at which it will do to put into the barn, and no more, in order to arrest the loss at the earliest possible moment. And this fact of the loss of sugar and starch, or of their transformation into woody fibre by too long exposure to the sun and wind, I think equally well established as that any transformation at all takes place, and as equally suggestive.

But on this point, far greater difference of opinion exists

among practical farmers, some considering one good hay day sufficient, while others require two and sometimes three, as if it were not possible to dry it too much. Our practice in this respect is, I believe, better than it used to be twenty years ago. Most farmers now think that grass can be dried too much as well as too little, and that the injury and loss in the crop is equally great from over-curing as from housing green. A practical farmer of Hampshire county says: "One good hay day is sufficient to dry Timothy, redtop or wet meadow. I think farmers lose more by drying their hay too much than by not drying it enough."

An experienced farmer of Hampden county says: "As far as my experience and observation extend, I think farmers dry their hay too much as a general thing. Grass should never be dried any more than just to have it keep well in the mow. I think it is best to get in hay as green as it will possibly do, for it contains more juices, which constitute its value."

A practical and experienced farmer of Worcester county says: "Redtop is a more difficult grass to make into hay than Timothy. To make hay from any grass, it is highly important that the swaths, of the hand scythe, be well shaken; here lies the secret of making hay evenly, without having green, heavy locks. If the burden is heavy, time in making the hay, if cut in the morning, will be gained by turning it by one o'clock, P. M., and then putting it into good sized cocks while it is warm. If the weather be clear, according to my experience, this hay will do to cart the second day without giving it much attention —the sap has become candied and it is fit for the mow. The exposing the hay to the air on the second day, by pitching, is of essential benefit. When carted the same day it is mown, unless dead ripe, it will be withy, clammy, and will be likely to smoke in the mow; in which case the hay has lost much of its valuable quality.

"To keep it till the third day and expose it to the rays of the sun every day, as some practice, dries out the juices and the stem becomes hard and brittle—the life of the hay is gone to some degree. Our mothers and grand-mothers used to dry herbs in the shade—I hold to curing hay in the cock."

Another practical farmer in the same county says: "My way of making Timothy and redtop is to mow it early in the morn-

ing, and when the dew is off spread it well. I like to dry it in one day's sun if I possibly can ; if not, put it into cocks before night, then get it into the barn as green as I can and not have it hurt. I do not want my hay all dried up. It injures it. Wet meadow I put into the barn on the day it is cut, if the weather is suitable for curing it."

A farmer of Berkshire county says: "If the weather is good and the grass not too heavy, we cut in the forenoon and get into the barn in the afternoon. If the grass is heavy and the weather not good, cut in the forenoon and turn over the swaths at night, spread and get in the next day. I do not believe in drying hay as much as some do. If not quite dry, two or three quarts of salt to the load will preserve it, and it will be the better." Another in the same county says: "I prefer to cut hay in the blossom on a good hay day in the forenoon, and it is fit for the barn, if raked with the horserake and care is used to turn it over and bring the green grass to the sun, by two or three o'clock in the afternoon of the same day. Much hay is spoiled by being dried too much."

A farmer of Franklin county says: "Timothy will dry sufficient for me in one good hay day. I dry less and less every year. If there is no moisture on it there is little danger of hurting after it is wilted." He cuts his swale hay before it matures and while it is quite green, and lets his upland grasses stand till they are fully developed and commence changing their deep green color. "I think it will keep the same stock longer and better if cut at that age." Another experienced farmer of Berkshire county says: "My way of making hay is to cut when in blossom, in the morning, shake it out evenly over the ground, turn it over at eleven o'clock, and get it into the barn on the same day if the weather is good. But if the grass is very heavy, I put it into cocks over night. I consider it made as soon as dry enough not to heat in the mow. To get drier than this is an injury to the hay."

One of the most extensive and experienced stock feeders in this State, a practical farmer, says: "I prefer to cut all English or swale grass from the tenth of June to the first of July, including Timothy and clover in the same time. More than thirty years experience has convinced me that hay secured in the above time,—or just before coming into blossom,—will

make cows give more and better milk and butter, will put more fat on animals for the slaughter, with four quarts of meal per day, than eight quarts of meal with hay well secured from the first of July to the first of August. That will give the second crop, if you wish, time to grow, and it may be cut the last week in August or the first week in September; there will then be a crop of fall feed, which most farmers prize very highly. If you do not wish a second crop, the feed by early mowing is very valuable. On the other hand, if the grass is cut late, the hay is not only poor but the feed is mere nothing. Every farmer of my acquaintance admits that the hay cut early is far superior to that cut late, unless it be those that are in the habit of selling hay; even that class must lose in the weight of their crop by late cutting. Many buyers have not yet learned the difference between early and late cut hay, when the real difference is, oftentimes, from four to six dollars per ton. Working horses and oxen will keep in better condition with half the grain when fed upon early cut hay; will look sleek and their eyes will be bright."

A farmer of Hampshire county says: "My method is to cut with the mowing machine, which leaves the grass perfectly spread. It is turned over between one and two o'clock in the afternoon, and while still warm and before the evening dew falls it is put into cocks. It is spread and turned the next morning, and at one o'clock is ready for the barn. I cannot tell on paper, the precise point of dryness at which hay should be housed, but with my hands, eyes and nose, I can judge when it is dry enough not to hurt in the mow, and not so dry as to crumble or to have lost any more of its virtues than necessary. The less drying the better, if it does not injure in the mow." Another practical farmer says: "I prefer two days, but want to have it lay thick together and stirred often the first day and but little the second. In this way the hay retains more of the juices, smells sweeter, looks greener and the cattle like it much better. Hay should be cured so that it will not heat in the mow and no more." Another says: "Hay may generally be dried enough in one good hay day with proper care, to be left over night in the cock and carried to the barn the next afternoon without spreading. Hay may be dried too much as well as too little." "Timothy and redtop," says a farmer of Berk-

shire county, "carefully spread as soon as the ground between the swaths is dry, and, if heavy, turned about noon, will dry sufficiently in one day, if a clear one, to be put into the barn before sunset. I believe many dry their hay too much. Never dry it so as to make it brittle when twisted in the hand."

These, and many other extracts of a similar import which might be given, did space permit, indicate with sufficient distinctness the prevailing practice among the best farmers, but as constantly intimated, it is very common to find hay dried far too much. Every farmer is aware of the importance of keeping his grass and hay as free from dew and water as possible. An exposure to rain washes out much of the soluble constituents of the grass, leaving a useless, brittle, woody fibre. Grass and hay are greatly injured by remaining too long under a hot sun without being turned. A somewhat different method is adopted for

Clover.—The natural grasses when cut for hay are generally spread and dried as rapidly as possible, in order to secure them in the best manner. Experience has proved that the same method is not applicable to the clover crops. It requires a longer time to cure it properly, and if exposed to the scorching sun it is injured even more than the natural grasses, since its succulent leaves and tender blossoms are quickly browned and lose their sweetness in a measure, and are themselves liable to be wasted in handling over. Most good farmers, therefore, prefer to cure it in the cock. A practical farmer of long experience in Worcester county says: "I prefer to mow clover when it is dry, free from dew; let it wilt, and the same day it is mown fork it into cocks which will weigh from forty to fifty weight when fit for the barn. Do not rake and roll it, that process will compress it too much.

"According to the weather and my convenience I let it stand —it will settle and turn the rain very well, and will answer to put into the mow while the heads and stalks are yet green and fresh. When fit to cart, the stalks although green, will be found to be destitute, or nearly so, of sap—the sap has candied and the clover will keep. On the day of carting turn the cocks over, expose the bottom to the sun an hour or so, and to a ton of hay add four to six quarts of salt in the mow.

"Good clover—not rank—cured in this way, I consider to

be worth nearly or quite as much as clear Timothy, to feed to a stock of cattle; and for milch cows, I consider it to be by far preferable to Timothy. Good clover hay will keep up the quantity of milk, while Timothy will diminish it."

Another practical farmer of the same county, in one of the best farming towns in the State, says: "My method of curing clover is this: what is mown in the morning I leave in the swath, to be turned over early in the afternoon. At about four o'clock, or while it is still warm, I put it into small cocks with a fork, and if the weather is favorable it may be housed on the fourth or fifth day, the cocks being turned over on the morning of the day it is to be carted. By so doing, all the heads and leaves are saved, and these are worth more than the stems. This has been my method for the last ten years. For new milch cows in the winter, I think there is nothing better. It will make them give as great a flow of milk as any hay, unless it be good rowen. For working oxen and horses its value is about one-quarter less than Timothy."

A practical farmer of Hampshire county says: "I can hardly state my own opinion of curing clover. When the weather bids fair to be good, I mow it after the dew is off, and cock it up after being wilted, using the fork instead of rolling with the rake, and let it remain several days, when it is fit to put into the barn." Another in the same county says: "I mow my clover in the forenoon, and towards night of the same day I take forks and pitch it into cocks and let it stand till it cures. The day I cart it I turn the cocks over so as to air the lower part. I then put it into the mow with all the leaves and heads on, and it is as nice and green as green tea. I think it worth for milch cows and sheep as much per ton as English hay."

A farmer of Middlesex county says: "I have found no better hay for farm stock than good clover, cut in season. For milch cows it is much better than Timothy. It keeps horses that are not worked hard better than any hay. And small clover, as the rowen crop, is better than any other kind for calves. Clover is not good market hay, as it wastes in removal from the barn. Stable keepers give much more for coarse Timothy that cannot easily be drawn through a rack." A farmer of Barnstable county says: "We mow clover in the forenoon and let it lie in the swath and put it into small cocks in the afternoon. If the

weather be fair on the third day, open it to the air and sun for two or three hours and then put it into the barn. I have found clover cured in this way keep sweet and free from mould, and of equal value with other hay." Another says: "I have tried three different ways of curing clover. One was, to make it in the same manner of other grasses; another, to dry it one day in the swath till wilted and then pitch it into cocks to stand some days, according to circumstances; and the third was, to give it one good day's sun, turning it over and getting out the water, and mixing it in the barn with old hay or straw. I managed in this way a year ago, the weather being very 'catching,' cut and dried it as much as possible in one day and carted it into the barn the same afternoon. I mixed it with some old swale hay that had been left over, placing a layer of old hay then a layer of clover, building it up in a square mow. My neighbors laughed at me and said I should burn my barn down by putting in that 'green stuff.' But I must say I never had better clover hay than that. The cattle would eat all the meadow, or swale hay, as well as the clover. There was not a particle of smoke about it on feeding it out. When cured in this way or by the second method, in the cock, I think clover hay is worth two-thirds as much as good English hay to feed out to farm stock."

From what has been said in these extracts, which might be multiplied, did space permit, it appears evident that good farmers appreciate the importance of so curing clover as to preserve its tender and succulent foliage. They are careful not to overdry it, for fear of loss of the blossoms and the leaves. But it is not uncommon among thriftless farmers, to handle it in such a way that the best parts of it are shaken off and destroyed.

The method detailed in the last extract, of mixing clover with a poor quality of hay or straw, has sometimes been adopted with great success, the clover imparting its fragrant odor to the hay with which it is brought in contact, greatly improving its quality, while its own value is preserved without injury. It is not only a matter of convenience oftentimes, to have the clover so secured in catching weather, but on careful experiment may be found worthy of being more generally practiced.

The general testimony of practical farmers as to the value of clover hay as compared with that of Timothy and redtop,

our prevailing natural grasses, varies exceedingly, some making it of equal value, others estimating it at one-half and from that to two-thirds and three-fourths.

Corn Fodder.—The practice of raising Indian corn to cut and feed out green by way of partial soiling, is very common in New England, as already intimated, in speaking of the natural history of the grasses. This culture has been carried still farther by many farmers, and many acres are raised in various parts of the State for the purpose of cutting and curing for winter use. And now that great hopes are entertained by many of the utility of the culture and use of the Chinese sugar cane, which, it is thought may be raised, cut and cured in the same way and for the same purpose, it is important to allude to the most approved methods of curing, though they may already be familiar to most practical farmers.

The common practice with regard to this crop, and which has been already partially stated, is to sow in drills from two and a half to three feet apart, on land well tilled and thoroughly manured, making the drills from six to ten inches wide, with the plough, manuring in the furrow, dropping the corn about two inches apart and covering with the hoe. In this mode of culture the cultivator may be used between the rows when the corn is from six to twelve inches high, and unless the ground is very weedy no other after culture is generally needed. The first sowing usually takes place about the 20th of May, and this is succeeded by other sowings at intervals of a week or ten days, till July, in order to have a succession of green fodder. But if it is designed to cut it up to cure for winter use, an early sowing is generally preferred, in order to be able to cure it in warm weather, in August or early in September. Sown in this way, about three or four bushels of corn are required for an acre, since if sown thickly, the fodder is better, the stalks smaller, and the waste less.

The chief difficulty in curing corn cultivated for this purpose and after the methods spoken of, arises mainly from the fact that it comes at a season when the weather is often colder, the days shorter, and the dews heavier than when the curing of hay takes place. Nor is the curing of corn cut up green, so easy and simple as that of drying the stalks of Indian corn cut above the ear, as in our common practice of topping, since then the

plant is riper, less juicy, and cures more readily. The method sometimes adopted is to cut and tie into small bundles, after it is somewhat wilted, and stook upon the ground, where it is allowed to stand, subject to all the changes of the weather, with only the protection of the stook itself. The stooks consist of bunches of stalks first bound in small bundles, and are made sufficiently large to prevent the wind from blowing them over. The arms are thrown around the tops to bring them together as closely as possible, when the tops are broken over or twisted together, or otherwise fastened in order to make the stook "shed the rain" as well as possible. In this condition they stand out till sufficiently dried to put into the barn.

But Indian corn stooked in this way often becomes musty or covered with dust, while the rains often soak it thoroughly and wash out much of its soluble matter, and its nutritive value is in a great measure lost. Besides, every one knows that to cut up a green plant, as a willow or any other thriftily growing plant or shrub, and set it up with the cut end resting upon the ground where it can still derive moisture from the soil, will prevent its drying. There can be no doubt, also, that the exposure to the sun, wind and rain, greatly injures it by removing much of its sweetness, or changing it to woody fibre, while it takes from it its beautiful fresh green color.

To avoid the losses necessarily attending these modes of curing, some have suggested kiln drying as far preferable, and, on the whole, as economical. I have known the experiment tried in one or two instances with complete success, the fodder coming out with its fresh green color, and apparently better relished by cattle than that dried in the ordinary way. This method appears to me to be worthy of much more extended and careful experiment. The kiln need not be elaborately or expensively contrived. The process of drying would be short and the labor slight.

Another mode which has been suggested is to hang it up in sheds open to the air, precisely as tobacco is cured in the western part of the State. This process would be longer, but the nutritive qualities of the plant would probably be better preserved than if cured in the open air with the exposure to the frequent changes of the weather. It is hardly necessary to say that if it is proposed to cure in this way, it should be hung

up thinly and the air should be allowed to circulate through it. After being well dried it is taken down and stowed away in the barn for use. This method avoids the trouble of stooking and the liability to injury from rains and dews, which blacken the stalks, though it requires considerable room, and is, of course, attended with some additional labor.

THE HORSERAKE.

This implement has come into universal use, and no farmer of any extent would be without one. It met with great opposition and encountered great ridicule on its first introduction, but has survived it all and become indispensable in all thrifty and economical farming. I shall do no more than give the authority of practical farmers in answer to the thirteenth question of the circular, "*Have you used a horserake, if so, what patent, and with what advantage?*"

To this, an experienced farmer of Middlesex thus replies: "I have used various horserakes for fifteen years. Much labor is saved by the use of any kind of horserake that has been introduced within that time.

"Horserakes are on a footing different from mowing machines. Grass may be cut in the morning, in the evening, or in a cloudy day. But hay must be raked at the very right time, or it may be entirely spoiled. It is, therefore, quite important to do work quick when the time for doing it comes. With a good rake a man and horse will gather more hay in half an hour than a laborer with a handrake usually gathers in a long afternoon —that is, one acre; this is considered a half day's raking by handrake.

"The independent rake operates quite well. The old revolving rake (Fig. 105) costs about the same.

"The spring-tooth rake is patented, as I am informed. One objection to this is, that the wire teeth scratch up too much earth. This is seen in Fig. 106.

"Buckminster's patent was obtained about sixteen years ago. His rake is quite simple in form and will gather more hay than either of the other kinds, in an hour. But the operator must walk, and a boy is wanted on the horse. The price is

four to five dollars, as any carpenter or wheelwright can make them."

A practical farmer of Worcester county says: "I have used what is called the independent horserake, Delano's patent, I believe, and with great advantage. I have also used the revolving and the spring-tooth rake. I prefer the independent. In short, it is my opinion, that no modern invention of agricultural implements has made so great a saving over the old method of performing farm work, as the independent horserake."

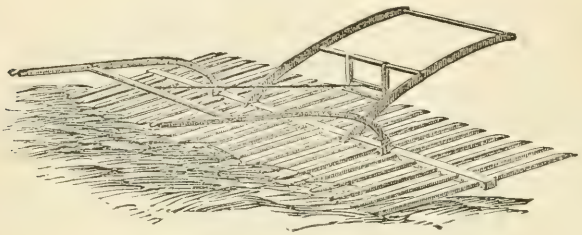


Fig. 105. Revolving Horserake.

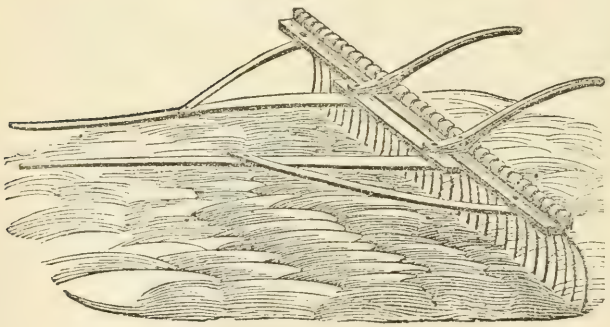


Fig. 106. Spring-tooth Horserake.

A farmer of Norfolk county says: "I have used Delano's independent rake for several years. I regard it as a valuable implement, saving thirty per cent. at least, of labor and time. This rake ought to be made of better materials and with more care, or it will be given up for some other." This rake is seen in Fig. 107. The complaint that it is very badly made and constantly liable to get out of order in consequence, is very general.

A practical farmer of Franklin county says: "I have used a revolver ever since I commenced working on a farm, and would

as soon think of haying without a pitchfork as without a horse-rake."

Another experienced, practical farmer of Worcester county says: "I used an iron-toothed rake three seasons, and I thought with profit, but I bought one of Delano's independent rakes, and I think it is worth three times as much as any iron-toothed one, as it does not make the hay so dusty as the others. It is also a great saving in time and labor, as a boy twelve years

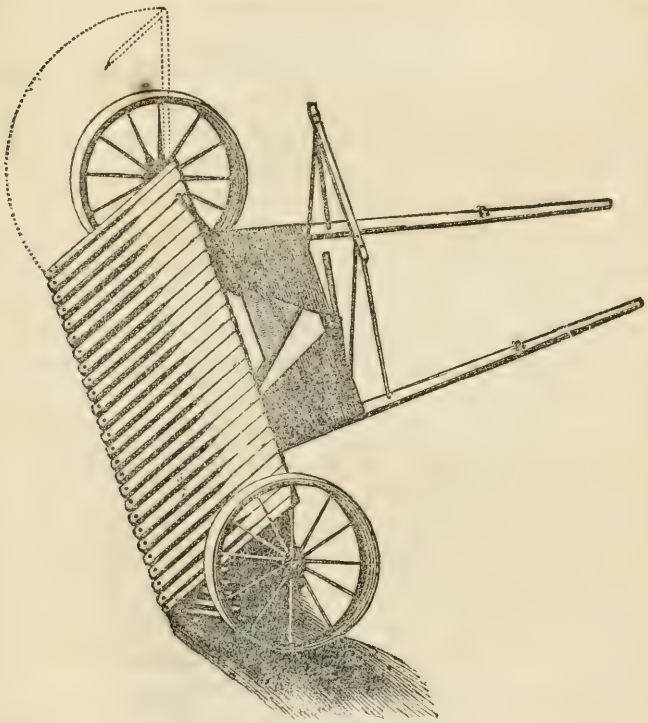


Fig. 107. Independent Horserake.

old will rake as much with Delano's patent, as a man and boy with any other kind I have ever seen, and do it better. I have used one of this kind for four seasons, and it has not cost me twenty-five cents a year for repairs, although my farm is rough and rocky."

Another says: "The horserake is a great labor-saving implement. For several successive years I used the revolving horse-rake to good advantage. There was labor in it, but it is a

good rake. Delano's patent—the independent tooth horse-rake—has taken the place of the revolver with me; it is managed with much more ease, the teeth each one acting independent of all others, at all times laying on the surface, whether even or otherwise, will rake cleaner than the revolver, and will not get so much dirt on the hay as will the spring-tooth."

And another: "I use the wire-tooth. The independent, or wheel rake is used some; both are good. I cut about sixty tons of hay, and my rake I have no doubt saves me $20 every year. First in labor, and second, in quality of hay—every thing being raked at night." Another says: "We have used the revolving horserake for the last ten years or more, and my opinion is, that could I have my choice between six men or a horse and rake, after dinner, with a quantity of hay to secure, I should take the latter."

A very successful farmer of Essex county says: "We formerly used the revolver with good success; but for the last four or five years we have used Delano's independent horserake and like it better than the revolver, as it is easier for the horse, easier for the person who uses it, and rakes better on uneven land. The great difficulty with the independent rake is, that it is so wretchedly made, that our farmers cannot depend upon it, and they complain of its getting out of order at times when they most need it. They are compelled to resort to the use of other patents which are not so convenient, on account of their being better constructed." Another in Hampden county says: "I have used the independent horserake for seven years, and find it a great labor-saving machine. It has not cost me a dollar to keep in repair and it is now as *good as new*, though most farmers who use it say it is liable to get out of order from being very badly manufactured. This, if true, is enough to condemn any farm implement, because farmers are not generally so situated as to be able to afford such frequent mishaps."

Still another patent, which promises to be a great addition to our present facilities for raking hay, has been introduced under the name of "Carpenter's Improved Horserake." This rake is seen in Fig. 108. It was patented in August last, and the parties interested claim for it very important advantages over the horserakes now in common use. The driver rides upon the

rake comfortably seated, and by means of a lever, which he can move at will, and without changing his position, frees the hay gathered in the teeth of the rake.

It is a double rake, made for both smooth and rough ground. On smooth ground the wheels may be used, while on rough

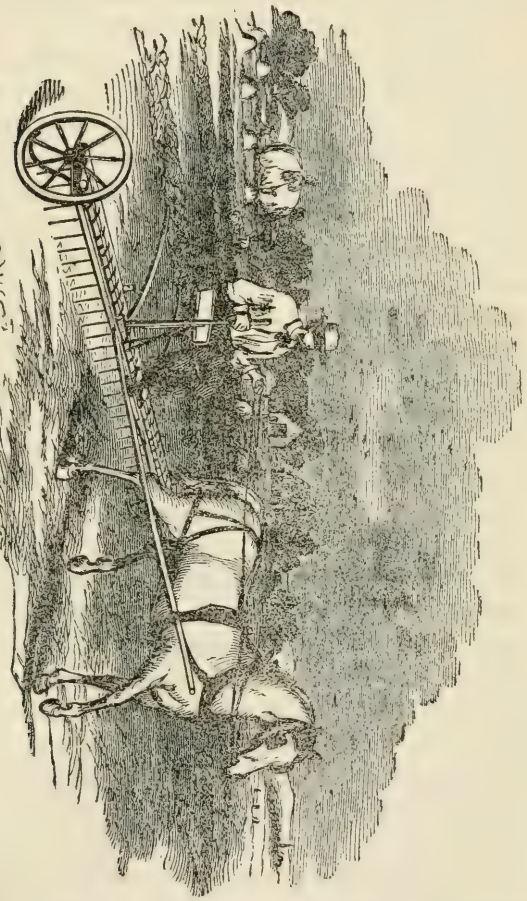


Fig. 1.8. Carpenter's Improved Horserake.

ground the driver may walk behind and manage it with ease, and adapt it without difficulty to inequalities of surface. It is simply constructed, and is manufactured by Nourse, Mason & Co., of Boston. As it is a new implement, and has never been used, to my knowledge, in this State, I cannot speak of it from personal observation or experience.

HAY CAPS.

The frequent losses to which farmers are subject in making hay, has suggested the use of hay caps, made to cover the cocks and protect them from the weather. It is but recently that their use was introduced, and like most novelties, it has met with objections from some, on the score of economy, while their use is as strongly approved by others, on the same ground. I have often seen them used, and the time taken to cover an acre of grass or hay in cock partially cured, is less than most would naturally suppose. Where they are to be used, less care is needed for "trimming down" the cock and putting it in a condition to shed the rain in the best possible manner.

An experienced, practical farmer of Worcester county says: "I have used hay caps with good results. I have one hundred made of cotton sheeting two yards square, with pins attached to the four corners with strong twine; the hundred cost me just forty dollars, I think they have saved me twenty dollars this year. I had at one time this season one hundred and thirty cocks standing out in a six days' storm. One hundred were covered, and not having caps enough, thirty were left uncovered. The uncovered was worth but little, while the covered was passable hay. I stooked some oats which I capped —they stood a two days' rain without injury." And another: "Our caps are made of heavy five-fourths cotton cloth, cut square with four little loops through which we run a slim wooden pin into the hay cock; the pins hold it better than weights in the corner. Ours cost twenty-one cents apiece— have saved the cost in one storm this season."

A practical farmer of Hampshire county says:—

"In reply to your question as to the utility of hay caps, it gives me pleasure to say, that, after using them constantly, for the last seven years, I consider them of the first importance in the most critical branch of farming.

"I can safely affirm, that my hay has been intrinsically worth, on the average, one or two dollars a ton more than my neighbors', which has been proved by the remarkable health of my animals.

"My horses have not been sick an hour, and the heaves are unknown in my stable, which may fairly be attributed to the fact that no musty hay ever enters my barn; and, it is probable, that the milk of cows may be as unhealthy, if they eat badly cured hay, as if fed on what is called swill in the cities.

"Having these covers always at hand, it has been my practice to mow my grass when it was ready, *without consulting the almanac, or waiting for a change of the moon;* and, the result has been, that I have had more than my share of good luck in this important branch of business.

"They are also very useful as a protection against heavy dews; and, as a cover for coarse clover and Timothy I consider them *indispensable*.

"After long experience, I have found the most approved method of making the hay covers, which may be used for wheat and other grain crops with great advantage, is to take stout, unbleached cotton sheeting, of a suitable width, say from thirty-seven to forty-five inches wide—the latter is the best—cut it into squares, and attach to each corner, by a string or otherwise, a pin made of wood, twelve or fifteen inches long, cut off smooth at one end and rounded over at the other, which completes the affair. The size of the pin should be about an inch in diameter.

"Hemming the selvages is a matter of fancy, as they would do very well without it; and, if a tannery is near by, it would greatly improve them by plunging them into a vat for two or three days; this would thicken up the cloth an inch or two, and make it more durable, as well as much more effectual. A decoction of bark, with alum, or some other astringent, would probably answer equally as well, but this is not *necessary*, to make an excellent hay cover. Like a cotton umbrella, the first dash of a heavy shower would cause it to spatter through for a moment, but would do little or no harm. I doubt whether a larger size than forty-five inches square, or forty-five by fifty, would be desirable,—mine have been not much over thirty-six inches square.

"At the suggestion of several practical farmers of this State, the Messrs. Chases & Fay, of Boston, are now establishing an extensive manufactory for the purpose of furnishing the agricultural community, throughout the country, with a ready

made article at the lowest possible price; but, judging from the extensive use of the covers last year, in consequence of articles published in agricultural journals in the United States, as well as Canada, it is doubtful whether they will be able to supply a quarter part of the demand. The article made by them is shown in Fig. 109."

A farmer of Norfolk says: "I have never used them myself, but they are used in the neighborhood to good advantage. A neighbor of mine who has used them for three years says they have been worth to him this year the whole cost, as with them he has been able to get all his hay in in good order, while a large quantity, where they were not used, was made nearly worthless by the long continued wet weather."

But on the other hand, a farmer of Middlesex county says: "I have never used hay caps, not having faith enough in them to give them a trial. My objections are, that they cannot be of any use as a permanent shelter, but only in a sudden shower—and then we have no time to put them on. We can save more hay by putting it in cocks and trimming well than by covering with canvas cloth. In fair weather the cap would be decidedly injurious, as it would prevent the escape of vapor or steam. Cocks of hay that are left to stand in the field over the Sabbath are often dried enough in the upper half. But in case caps were put on for Saturday night the drying would not advance on Sunday unless you should make it a business to remove them on Sunday forenoon."

A permanent structure for covering and protecting hay stacks is described by a farmer of Bristol county as follows: "I have a structure called a hay cap, which, if farmers have not sufficient barn room, I think would be economical, as hay can be more rapidly secured than in the common stack, obviates the necessity of fencing and prevents the hay from becoming wet while the stack is open for feeding. This cap is twelve feet square and consists of two sills fourteen feet in length and eight inches square, four posts five inches square and seventeen feet long framed into the sills one foot from the end of the same. The sills are held together by two girts framed into the post just above the sill. The posts are held firmly by girts placed five feet eight inches above the sills, to which height the box part of the structure is boarded. The posts above the box

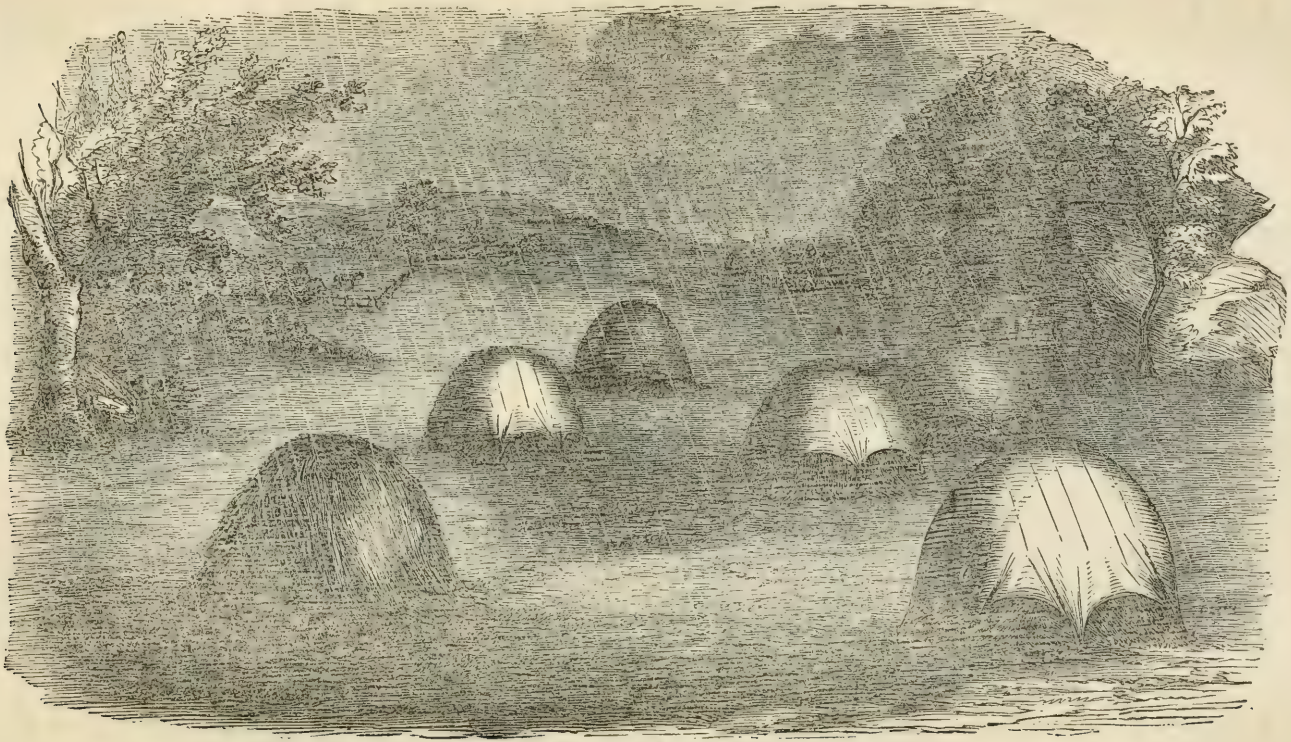


Fig. 109. Hay Caps.

are perforated with holes one foot apart for the insertion of pins to sustain the cap or cover. This (in form of a pyramid) should be made as light as possible, so that it may be readily raised by placing the shoulder under the corner. The frame of three by four joists, must be large enough to fall outside the posts and admit of some play. The rafters are small joists nine feet in length, the feet resting upon short pieces of joist placed across the corner of the frame, thereby forming openings for the posts to pass. The tops of the rafters are nailed together over the centre of the frame. Girts should be placed half way from the eaves to the point of the roof to nail covering boards to. These should be good half-inch stuff, and run from the eaves to the rafters. The top of the post should be kept from spreading by stay lathing them. A hay cap of the dimensions given, will hold five tons of hay. The cost I do not know, as this was on the place at the time of my coming on to it."

FALL FEEDING.

This is the term applied to feeding off the aftermath of mowing lands. This practice is very prevalent, and is justified by experienced farmers rather on the plea of necessity than any other, since most farmers, of careful observation, admit that it is, on the whole, injurious. A large proportion of those who are in the habit of fall-feeding, speak like the following, from a practical farmer of Middlesex, who says: "I feed off slightly, although it would probably be better for the next crop if I did not. My cows, however, like it, and as they pay me well at the milk pail, I like to see them enjoy themselves." Another, in answer to the questions, "Do you feed off the after-growth of your mowing lands in the fall? Do you think it an injury or a benefit to the field to feed it off?" says: "I do generally, but consider it an injury to the field." Another says: "I do feed off, moderately, the after-growth of my mowing fields, and believe the grass worth much more so fed than if left on the ground to rot. A dense mass of dead grass is also much in the way of the scythe and the rake the next year." A practical farmer of Worcester county says: "I feed off the after-growth of mowing lands only when I am compelled to do so in dry seasons for want

of pasture. I think it an injury to feed off, unless there is a large growth, which is better to be fed off, so that it will not fall down and heat the roots and kill them."

Another says: "I feed my mowing lands in the fall and think it is a benefit to the field in all cases where a top-dressing is used, and of no injury to an old field that is ploughed once in three or four years. Where a large growth of after-feed remains on the land it is like mulching trees, kills the grass roots and makes a grand shelter in winter for mice."

A farmer of Hampshire county says: "I feed it off and then top-dress it, and think it a benefit to the land, but should consider it an injury if I did not top-dress."

An experienced, practical farmer says: "I feed it off, but think it an injury to the field to do so, and I should much prefer not to feed mowing lands at all. The grass holds in longer and is of better quality. I feed it off because it is necessary to eke out a comfortable support for my stock." And another: "To some extent. I do not think it beneficial to the land to feed much every year, nor very injurious to feed some; but to feed close, I deem highly injurious."

A very experienced farmer of large observation, in Plymouth county, says: "To some extent, I feed it off, not from choice but convenience. The treading of the cattle is some injury, and they feed on the best kinds of grass and leave the wild grasses to extend the area of their growth. In my experience, mowing grounds are kept in the best condition by taking off the first and second crops with the scythe, and biennially dressing with compost manures."

This accords with the experience of another practical farmer who says: "My practice is to feed the after-growth or mow it. To take all from the soil without returning an equivalent, would be injurious. My custom is to top-dress my mowing grounds with good compost manure, about fifteen cart loads to the acre, once in two or three years—a portion of lots in one year and a portion the next. Where the ground is not liable to wash—carry the manure off—I prefer spreading the manure in the autumn; it is dissolved by the fall rains and winter snows, and the grass is benefited in the early spring."

An experienced farmer of Essex county says: "Farmers here are in the habit of feeding off their mowing lands in the fall,

but have no doubt that the crop of grass would be better the next season, not to feed them. Some think the injury not so great as the value of the feed of the after-growth."

A practical farmer of Franklin county says: "I have had considerable experience in both ways, and do not think fall feeding is any injury if it is not fed too close; prefer feeding to mowing the second crop, and prefer feeding with sheep than cattle." And another: "The feeding of dry mowing injures it by causing it to run out, leaving the roots exposed to the winter, while moist land is injured by the cattle's feet much more than the value of the feed, in both cases taking all off and leaving nothing to renovate the land another season."

An experienced farmer in the same county, and one of the best grazing towns in the State, says: "It is now more than twenty years since I have allowed any kind of domestic animal to feed upon our mown lands, and my opinion previously has been fully confirmed by my experience. It is a decided benefit to let the after-growth remain upon the land; it is a protection from summer's drought and winter's cold. Some of my neighbor's are following my example." And another: "I sometimes feed off my after-grass. When I do feed it off, I take good care to feed it early and leave a good growth to protect the roots of the grass from frost in winter. I think it an injury to feed; mowings will last longer not to be fed at all, and the land when broken up will produce a better crop of corn or potatoes than if fed."

From these extracts it will appear that the practice of fall-feeding is very general, while the good judgment of practical farmers almost unanimously condemns it as injurious, especially to feed closely and late in the season. The reasons assigned for the practice are chiefly, the necessity generally felt for feed at that season of the year, and the importance, in some situations—particularly on interval lands—of removing all protection for the mice, which frequently prove very destructive to the roots when buried with the snow in winter. All condemn the practice of too close feeding, under all circumstances.

The fall growth collects the elements of a thrifty growth in the following spring. These are stored up in the roots over winter for the early use of the plant. If it is closely fed, the spring growth must be proportionably later and feebler.

GENERAL TREATMENT OF GRASS LANDS.

The importance of having the ground well tilled and thoroughly prepared by liberal manuring before committing the seed to it, is too apparent to need remark. When the seed is sown, it is the common practice to harrow it in, either with an iron tooth, or a bush or brush harrow, or both, and those who adopt a more careful culture follow these operations with a thorough rolling, which compresses the soil and usually causes an earlier germination of the seed. The importance of this last operation, that of rolling, is too often overlooked. By reference to table XV., the importance of covering at the proper depth is also apparent, since it will be seen that a large proportion of the seeds germinated with a very slight covering.

But if one thing more than another may be said to lie at the foundation of all real improvement of grass lands, or lands under a course of rotation, it is a proper system of drainage. Especially is this important for low, wet lands, since it not only frees them from superfluous water, thus making them more susceptible of tillage in early spring, but actually increases their temperature several degrees, in some cases as much as from eight to ten, and rarely less than from two to four, and admits the air to circulate more freely around the roots of the plants. The aquatic grasses require large and constant supplies of moisture, and when the soil is changed by drainage, the more valuable species of grass may be introduced and cultivated in it. But one of the most important questions which the farmer of New England has to meet, is the proper treatment of his pasture lands. Many of our old pastures have been stocked hard time out of mind, and the grasses in them have been literally starved out and grow thin of necessity, while, as the finer and nutritious grasses disappear, nature very kindly covers up the nakedness of the soil with moss, as an evidence of the effect, and not the cause of poverty. They are said to be "worn" or "run out." Many of them are grown over with bushes and briars and other equally worthless pests, till they carry but one animal to four or five acres, and often require twice that amount

to keep an animal on foot, to say nothing of fattening him. It is a well known saying that, "Poor pastures make breachy cattle."

Undoubtedly thousands of acres in this State would be far more profitably covered with pines than with cattle, and many an observing farmer is now convinced of this fact; but still we must have pasture lands, and there are circumstances where it becomes important to improve them and increase their productiveness. Some of them are so situated that they can be ploughed and thus brought in, with other cultivated lands, to the general rotation; and where this can be done, it may be, on the whole, the best and most economical mode of improving them.

A well known farmer of Worcester county says: "I have renovated my old pasture land by pulling up the bushes by the roots, scarifying the foul or mossy places with the harrow, and sowing on grass seed and clover, both red and white." Another says: "Plough, manure and re-seed. Some have sown rye with the grass seed and then let the stock feed on the rye, as it will not produce any seed-stalks—it sometimes lasts three years. This method has been put in practice with marked success. On our hills, ground plaster or gypsum has brought in the white clover the next year after sowing." A practical farmer of Middlesex says: "The best method I have found is to plough in forty loads of good stable manure to the acre, plant, hoe, and kill the bushes and moss, then seed down with redtop and white clover, instead of taking a crop of rye without adding any thing to the soil, then seeding down with 'barn chaff' as many do." An experienced farmer of Hampden county says: "If the pasture lands can be ploughed, do it in the month of June, say seven inches deep, harrow thoroughly, sow one hundred pounds of Peruvian guano and three pecks of buckwheat, per acre, harrowing them in at the same time. Sow as much grass seed and of the kind best adapted to the soil as you please, and bush it in. I have tried twenty acres at a time with good success."

Another says: "It can be done in various ways. I have a piece of pasture land near my house that bore hardly a spear of grass, and nothing else, except five finger and other weeds that usually grow on old, worn out pine plains, and I commenced twenty-four years ago by sowing Timothy and redtop and a bushel and a half of plaster of Paris, per acre, once in two years

up to this time; the grass increased from year to year so as to cover most of the land in thirteen years. Ten years ago I commenced ploughing it. I ploughed about one acre and put on fifteen loads of compost manure and planted it with corn. I sowed it down in the fall with rye, Timothy and redtop, and sowed clover in the spring, and about a bushel and a half of plaster of Paris, per acre. The next year I ploughed another part and manured it the same, except that I planted this with melons, dunged in the hill, seven feet apart, and then sowed it down in the fall the same as the other piece. The next year I took up the remainder, and all the manure I put on the piece, except in the hill, was the water carted on it from a hole in my barnyard. It was immediately ploughed under, then holed and dunged in the hill seven feet apart, planted with melons, and in the fall sowed as the other parts. Since that it has continued to bear very large grass. When I have turned my cattle into it the first of June, I have judged, and others who have seen it, that had I not pastured it I might have cut a ton to the acre. The soil of this piece consists mostly of sand resting upon a subsoil of gravel. Most of our pastures are spoiled by feeding off too early in the spring and overstocking. Cattle should not be turned in till the first of June, and then not overstocked, so that there will always be spots of grass to go to seed, which will keep the pasture well stocked with grass. Always keep your pasture stocked with grass; if you cannot keep it on any other way sow on Timothy and redtop and harrow it in, once a year. I prefer to do it in August, but any other month in which you are most at leisure, will do.

Another experienced farmer says: "Old pastures should be ploughed and planted when they are not too rough for those operations. They may then be seeded down in July among corn or beans, or grain may be sown with the grass seed in the following spring. But we have too much rough pasture unfit for the plough. It should never have been cleared for pasturing, but should have been left to run to wood. Such rough lands are often much improved by sowing plaster at the rate of two hundred pounds per acre. Plaster generally works well on clays and clayey loams which are not wet." Another says: "Where I have ploughed and planted old pastures and then seeded anew, the cattle get a much better living." One of the

best farmers of Norfolk county says: "Either by ploughing, rolling and sowing down grass seed and grain in September or April, or ploughing in manure after removing the crop on old ground, and cross plough in the spring, then spread and harrow in guano, at the rate of three hundred pounds per acre, or a good dressing of compost, and sow Rhode Island bent, or redtop and white and red clover, with some variety of grain; or by scarifying mossy ground, and sowing in grass seed and harrowing it, then applying three hundred pounds of guano, or one bushel and one peck of salt, or ashes from ten to twenty bushels, per acre, harrow and bush the ground. Sow early in fall or spring."

A farmer of this State who has lived and had a large observation in England, says: "Some farmers say the plough. But in England, where old pastures are seldom broken up, I have known extraordinary results from top-dressing with crushed bones, more particularly on the large dairy farms in Cheshire. I am sorry I cannot give you the quantities. A neighbor of mine has harrowed an old, worn out pasture, dressed with a liberal coating of Barrilla ashes, from six to seven cords per acre, and sowed white clover and rolled it. It came out a beautiful pasture. The brush harrow and roller applied to all grass land in the spring will amply repay for the labor. Breaking and spreading the cattle droppings on the pasture land is well worth attending to." A farmer of Worcester county says in answer to the sixteenth question of the circular:

"This depends on the kind of land to be reclaimed. If it can be ploughed I would plough it and plant it with potatoes or something else to make it mellow and fine, and then sow it to grass. If it is too rough or stony to plough,—which is the case with a large share of the pasturing in this section,—but is good, sweet, warm land, I would feed it with sheep. I have a pasture of this description, that a few years ago was covered with briars and bushes so thick that there was but very little grass upon it; I cut off the bushes and put on sheep enough to eat every thing that grew upon it for four or five years. They have killed all the briars and most of the bushes. I have sowed some plaster of Paris, which is all I have done to it, and now one acre is worth, and will produce more feed, than three would ten years ago. I should say that my sheep have always done well on this pasture. If the land is cold and

wet, and inclined to grow bushes, I let it go and never try to reclaim it, unless it is near the buildings or near the village where the land is very high. In that case it may pay to ditch and work it into good smooth land."

Another practical farmer of great experience says: "We have a variety of soil in this town; some of the best of pasture lands, stony soils, generally clay subsoil. Plaster of Paris is our renovator for pasturage. It works most admirably on almost all of our lands. Two hundred pounds to the acre, applied once in two or three years in early spring, will keep our pastures good." Another in Plymouth county says: "The best method I have ever used is to fence in small pieces and then stock hard with sheep. Feed it down till no green thing remains, then turn the sheep off days and on nights till September, then harrow the land with a sharp harrow and sow on grass seed, keeping the cattle off the remainder of the season."

An experienced farmer of Middlesex says: "It will improve an old pasture merely to plough and re-seed it without manure, but this is a slow mode and not to be recommended where it is possible to apply some sort of dressing. A better method is, without doubt, to plant for a year or two, manuring well, before sowing grass seed. The soil by being thus thoroughly stirred, and exposed to atmospheric influences, will give a sweeter grass and perhaps more of it. But it is not always convenient to plant a part of a pasture. In such cases great benefit would result from simply ploughing, manuring and seeding to grass immediately."

But perhaps the best disposition that can be made of many of our poor, thin pasture lands, and one which has incidentally been alluded to, is to take the cattle from them entirely and cultivate them with forest trees. This is frequently recommended in answer to the question proposed in the circular. A farmer of Middlesex county speaks in the following words: "Old worn out pasture lands that cannot be renovated by gypsum or ashes, had better be suffered to run up to wood. Pine lands can be seeded in the fall with a crop of winter rye, or without. Pine seed can be obtained by taking pains to collect the burs before they are open and drying them in some place where they can be threshed. This is white pine seed year."

This, I am convinced, will be found to be perfectly practicable, and a rapid growth of pine wood, intermixed, as it should always be, with some deciduous growth like the white birch, will be found to be more profitable than the use to which they are now put.

I know many pastures of good strong soil, never ploughed within the memory of the living, some of which are known not to have been ploughed for a hundred and fifty years, which require from eight to ten acres to a cow, so entirely buried are they in moss and bushes. Such lands can be planted with pines at a small cost, and would soon be covered with a growth which would pay a large percentage on the outlay. I have, during the past season, examined over five hundred acres of cultivated pines in different parts of the State, varying in age from three months to twenty years, and can testify to the surprising rapidity with which such a plantation will cover the ground, concealing the fact of their being planted by the hand of man, and assuming the appearance of a dense forest. In one instance the owner informed me that his plantation had averaged him a cord to the acre every year for twenty years during which it had been planted, while the land, a light barren sand, had apparently been improved, and a thick undergrowth of hard wood was apparently ready to succeed the pine when the opportunity offered. I have seen a growth of pitch pine, made this year, of over two feet six inches in length by measurement, and a growth of white pine, made in the same time, of two feet nine inches. The past year was an exception, for while generally the growth of wood is interrupted by the drought during the hottest months of summer, and then starts out a new growth in the autumn, it continued with extraordinary vigor all through the season, in those parts of the State which were favored by frequent rains. The average growth would not, of course, equal that stated above.

But still, there are circumstances, and they are not by any means unfrequent, where it is both practicable and desirable to take other methods of improvement for pasture and grass lands, and we come now to consider more in detail the

TOP-DRESSING OF GRASS LANDS.

The idea was formerly entertained that pasture lands were sufficiently enriched by the animals which fed them. Practical men begin to think otherwise, for it is found that a profitable return is made for the little outlay which they require. Particularly is this the case with pastures fed by milch cows. They do not return the essential elements of the plant to the ground in so large a proportion to what they take from it, as some other animals. These elements are required in great quantities to form their milk, while in other animals they are required only to form bone and muscle. The ordure of cows is, therefore, less valuable and fertilizing than that of other animals. The consequence is, that lands fed wholly by cows are exhausted sooner than those fed by other animals. For it is evident that where more is taken from the soil than is returned, exhaustion must follow.

We furnish animal and vegetable matters to the earth, to supply it with substances which the growth of plants has taken from it. It will be obvious, on a moment's reflection, that the constituent parts of the plant are taken up from the earth and the air, in much the same manner as our food and drink become our bone and flesh. The analogy is still more distinct when we reflect that all our applications for the improvement of the soil, are nothing more than the supply of food for plants. For the food of plants is found in all manures, and the value of these depends upon the quantity they contain.

The methods of renovating mowing and pasture lands by means of top-dressings, do not essentially differ. An interesting experiment, not long ago, fell under my observation. On different parts of the same field, common meadow mud, rich barn and liquid manure impregnated with lime, were used as a top-dressing. The mud was hauled out in the autumn and thrown in heaps, and there left to the action of the frosts and snows of winter. In spring it was spread about the same time the other manure was applied. Strange as it may seem, the top to which the mud was applied, appeared to far the best advantage. The grass was heavier, and after the crop had been removed, that

part of the field on which the mud was applied, came in more quickly and luxuriantly than the rest. This field was a light, gravelly soil, which had not been under very high cultivation. Many of our soils are composed of gravel with a mixture of sand. These soils need the constituents of marl and meadow mud. Marl and mud contain the carbonate, or in some cases the sulphate of lime, or plaster of Paris. They contain a mixture of clay, which sandy or gravelly soils need. And on these soils clay mud has been found to do the best. Peat mud is a rich vegetable food, and if a small proportion of potash, or ashes, be added, it is valuable as a manure. Light soils are always improved by any substances which make them firmer and more compact. Stiff clay soils, on the other hand, are benefited by applications which make them lighter and more permeable. No one of the three kinds of earth, sand, clay and lime, when unmixed with the other varieties, would be capable of supporting vegetation. The mixture of them, when any one predominates, will correct and improve them. For the fertility of soils depends upon the proportion of their constituents. In some marls the clay predominates. These should be used on the light sandy soils. In others the sand predominates. These are adapted to stiffer lands. The practice of mixing soils has always been attended with success when judiciously managed.

Nor is this application of mud and clay any new fact to the practical agriculturist. The county of Norfolk, in England, is said to owe much of its great fertility to this source. The greatest European improvements in sandy soils, have been made by these means, in Belgium. As intimated in the experiment alluded to, it has always been found best to expose the mud or clay to the action of the frost. It becomes mellowed so that it may be spread evenly upon the ground. Peat mud is composed of vegetable matter which has been accumulating for ages. When taken fresh it is found to contain an amount of acid which would make it improper for immediate use. Exposure to the frost, wind and rain, entirely neutralizes the acid properties. Ashes, or potash, would have the same effect.

These substances may be said rather to ameliorate and improve the texture of soils than to furnish immediate sustenance to the plant. And in this view they cannot be too strongly recommended, for we have never known them to fail of having

beneficial effects, both on pasture and mowing lands. And besides, the application of them is so simple, so much within the reach of every farmer, that it is well worth the trial. If the soils are much worn, or very barren from a great preponderance of any particular earth, a liberal allowance will be required. Ordinarily, as in the experiments which have come under my notice, some twenty-five or thirty cart loads to the acre have been found sufficient to increase very greatly the productiveness of the land. A still less quantity would be of essential service. Nor is the expense of this application so great as some imagine, for almost every farm contains a quantity of waste peat meadow, and clay is frequently near at hand. It may be removed and prepared at a season of the year when there is but little else to do. The expense, therefore, need not deter any one from its use.

But there is another substance equally accessible, which acts both as an ameliorator and a fertilizer of the soil. It is, perhaps, one of the cheapest and most profitable top-dressings. It is the rich loam which accumulates in the holes by the road side, and wherever the wash gathers from hills. Every one has observed the effect of the loam thrown out upon the grass in ploughing. The grass along the edges soon becomes greener in spring, and grows with greater luxuriance. The wash by the road side would have a far more powerful effect. For this contains, besides the putrescent animal matters, from the road, a quantity of sand, which rich soils wanting closeness and consistency, require on the surface. Spread upon such soils when covered with grass, it is very efficacious, and often makes the vegetation as vigorous as stimulating manure. Experiments have clearly shown that the effect of sand on some soils is to operate as a manure.

Among the mineral manures, lime has sometimes been used as a top-dressing. Its effect arises not so much from any direct nutriment furnished by it to the grass, but from its influence on the substances in the soil. It hastens the decomposition of vegetable and mineral matters in the earth. In this way it renews exhausted soils. It increases the temperature of cold sour lands after being drained. It causes a rapid decay of peat substances. Hence its use in the compost heap. It destroys the mosses and coarse herbage which work in among the grasses,

and indicate the want of lime in the soil. It produces from them a fine, vegetable mould, by causing the white and red clover, and some natural grasses, to come in thicker and thicker each year. Lime produces a more marked effect on the grasses than on any other crop. It seems, very frequently, to increase the nutritive quality of the grasses as well as to increase their quantity, by assisting them to elaborate the juices, the albuminous substances and the sugar, in which their value as food for stock largely consists.

But lime can never supply the place of other manures. There are properties which it cannot supply, which plaster can; others which it cannot supply, as bones can; and others which it cannot supply like ashes, and manures that contain salts. There are situations, however, in which it is invaluable. On reclaimed meadow lands, after thorough draining, and a covering of three or four inches of gravel, a top-dressing of lime has a beneficial effect. Crops of grass of two and three tons to the acre, have been taken after such a dressing of lime. In many cases the first crop will repay the expense of bringing such land into cultivation. In these situations, then, as well as on many pastures, it may be called one of the most useful applications that can be made. Such lands will bear an abundant supply of lime without exhaustion. But on poor sandy soils it should never be used. It will soon exhaust and may render them completely barren. When it meets with clay in lands to which it is applied, it forms a kind of marl, and greatly improves the texture of the soil. But when it comes in contact with sand, it forms, rather, a sort of mortar. Hence it is thought to be injurious on sandy soils. Many soils have naturally a sufficient quantity of lime, and on these a further application is not needed.

No definite rule, with respect to the amount required, can be given. It must depend upon the nature of the soil, and must be left to the judgment of those who use it. In general, on peat and clay soils, from ten to fifty bushels to the acre will be required, though less would, perhaps, be beneficial.

The addition of lime to the compost heap is often of great importance. The decay of all vegetable substances is accelerated by it; but it should not be brought in contact with decaying or fermenting animal substances unless covered by a thick

coating of peat or other absorbent. Whenever lime is used in a compost—unless it be for the special purpose of hastening the fermentation of vegetable substances—it ought to be mixed with salt by dissolving the salt first in water and slacking the lime with it. A bushel of salt will thus prepare four bushels of lime. Refuse brine will answer very well.

We come now to the use of ashes as a top-dressing. Of this we may speak with more confidence. For while experiments with lime have not invariably proved successful, owing, probably, to the soils designed to be benefited, we know of no instances in which the application of ashes has not fully repaid the expense. If farmers would bear in mind that ashes contain all the elements which assist the growth of plants, they would be unwilling to part with a substance which they might turn to such profit. If the quantity is small, let it be husbanded with the greater care, instead of being sold, with the idea that so few can do no good. One substantial farmer says: "I am now, more than ever, fully persuaded of the value of ashes as a manure. Nothing in the whole catalogue of manures, compares with them on my land. The soil was a thin, clayey loam, and where the ashes were sown there was a crop of excellent clover, where for years the land had been almost unproductive."

Grasses are often more benefited by ashes than other crops, since they require a greater amount of the salts which ashes contain. For all permanent mowing lands, especially on the lighter soils, ashes are among the cheapest of manures where they can be had in sufficient quantities. In parts of Flanders and Belgium, countries in which the science of agriculture has been carried to a high perfection, the great loss of vegetable matters from the soil is constantly restored by ashes or bones, together with other manures to be mentioned hereafter. Indeed, almost all agriculturists, both in Europe and America, have attached very great importance to the use of ashes. In some parts of Germany they are held in so high esteem that they are transported to a distance of eighteen or twenty miles, to be used as a top-dressing. According to Prof. Liebig, with every one hundred and ten pounds of leached ashes of the common beech tree, spread upon the soil, we furnish as much phosphate as five hundred and seven pounds of the richest manures could yield. Now phosphates are highly useful to all kinds of soil.

There can be no doubt that the process of leaching takes from the ashes a part of their fertilizing properties. For many uses this is no objection. Especially is this the case near the sea, where leached ashes are thought by some to be even more serviceable, as the salt in the atmosphere the more readily combines with them. Every practical man has heard of the amazing effects which bone dust has upon the soil. Yet this is valuable, chiefly, for the phosphate it contains. But if we may rely upon the statement of Prof. Liebig, leached ashes also contain a large amount of phosphate of lime, which would show them to be extremely valuable. But suppose we allow four bushels of leached ashes to one bushel of crushed bones, the expense of the ashes, would, in most cases, be less than the bones. But if bones can be procured, a mixture of leached ashes and bones, four bushels to one, forms a very useful application. The compound should remain a week or two before being used. Those who have tried leached ashes, have been fully satisfied of their superior qualities as a fertilizer. Careful experiments, by practical, conservative men, show that land producing one ton to the acre, has been so improved by this means as to yield three tons to the acre. Where thirty bushels were used on three-fourths of an acre, in one instance, the crop was increased more than three-fold. Nor are leached ashes subject to the objections which are raised by some against the use of lime. They do not apparently exhaust the soil. The effect of them is felt for several years. Many farmers have found by experience, that one bushel of unleached hard wood ashes is nearly equal to two bushels of plaster, as a top-dressing for the dryer grass lands. If this be true, what has been said would show that leached ashes are about equal to plaster in their effects on such lands. A peck of lime is commonly used in leaching a bushel of ashes. This, of course, adds to the value of leached ashes for grasses. They contain, also, a portion of the alkali which is decomposed by the action of the atmosphere, and the water in the soil prepares it for the food of plants.

As we have already spoken of the use of mud, it is proper here to say that ashes may be mixed with mud in the proportion of six or eight bushels to the cord. The mud is better, as usual, dug in the autumn, though the mixture might be made in the spring, or on application to the soil. If leached ashes

are used, the proportion may be about one to three. In this case, the two substances mutually assist each other, and the compound is, perhaps, better than either alone would be. So potash added to peat mud, makes a valuable compound.

In this connection we should allude to the practice of burning sea-weed as a manure. The ashes of it are spread upon grass and pasture land. They form a very useful and powerful stimulant, but the process of burning sea-weed causes the loss of its most fertilizing qualities. The most common and efficient mode of application is to carry it directly upon the grass as a top-dressing. The coarse rock-weed and kelp decay in a much shorter time than the fine sea-weed, and are, no doubt, better than this. Whenever sea-weed is used, it is best on sandy or gravelly soils. From twenty-five to thirty, or even forty cart loads to the acre, are sometimes applied. Peat ashes form, in some cases, a valuable top-dressing for grass and pasture lands. In Holland, where every fertilizer is preserved with care, peat ashes as well as wood and coal ashes, are highly esteemed. The great value of the first is well known to many, and if those who have them will spread them upon grass at the rate of fifteen or twenty bushels on the lighter, and thirty or forty on the heavier soils, they will be abundantly repaid.

If what has been said be true, and it is the result of many experiments, some of which have come directly under my own observation, farmers would do better to buy ashes on the return of every spring, than to sell them, as is often done.

Of the use of gypsum, or plaster of Paris, the most contradictory opinions have been expressed. So far as my observation goes,—and I have both seen and tried many interesting experiments on the old soils of this State, and the newer soils of Maine,—the application to moist soils has been satisfactory. It has been said that plaster does not benefit natural pastures. This, I apprehend, depends chiefly on the character of the soil. In one instance, a large pasture which had become worn and somewhat unproductive, received a generous top-dressing of plaster. The grass started sooner, and continued throughout the season to look far better than the adjoining pastures of precisely the same soil. So far as could be ascertained, the increase in grass over the adjoining pastures, was about seventy-five per cent. Nor was this all. This pasture came in the next season

with the greatest luxuriance, and its load of beautiful green was the wonder of the neighborhood. Its effect on clover and Timothy is even greater than on pastures. Many have supposed that plaster would exhaust the soil. This would not seem to be the case, for as it takes four hundred and thirty parts of water to decompose one part of plaster, its decomposition is slow, and consequently its influence is felt for several years. How, then, can it have such immediate and beneficial effects? It retains the fertilizing gas which is constantly rising from fermenting vegetable matter, and gives it up at a proper time for the nourishment of the plant. It does not, like lime, cause vegetable matters to decay, but rather when they decay, holds their most important parts from escaping.

The infectious odor which rises from decaying vegetable matter, from the stable, from the manure heap, and imperceptibly from the whole surface of the earth, is one of the most important elements for the growth of the plant. Plaster fixes this, and the first shower washes it into the earth to feed the roots of plants. The relative value of manure depends, in a measure, upon the amount of this noxious odor, this ammonia which it contains. This gas, commonly known as hartshorn, is an exceedingly powerful stimulant. Nor will it appear unimportant, when we bear in mind that two and one-quarter pounds of this ammonia, lost by fermentation, is equal to the loss of one hundred and fifty pounds of grass or grain. Scientific men will say that this gas is taken up in the atmosphere by the rain, and descends with the rain to fertilize the earth. This is true. This ammonia, this infectious odor, so valuable, so indispensable to the earth, is not lost forever when it flies away into the air. But does not the shrewd farmer perceive that as much of this as he allows to escape from his own lands, by neglect, falls upon, and improves the fields of his neighbor as much, and perhaps more, than his own? Is it not evident that by saving all that he can, and by receiving whatever the genial rain brings with it, he gets a double benefit?

If the effect of plaster is such as we have described, no one can fail to see how important are the functions it may be made to perform. But it also adds a certain amount of lime and sulphur to the earth. It is composed of these substances for the most part, and hence called by chemists, sulphate of lime.

We shall have occasion to speak of its use in connection with other manures, when we speak of the compost heap. We now allude to its use by itself, as a top-dressing.

On some soils it is not so satisfactory as on others. But our pastures are many of them covered with the white honeysuckle. These are often called clover lands. On all clover lands, whether reserved for pasture or mowing, plaster generally has a wonderful influence. A bushel, or two bushels to the acre, have been known to double the crop, and to add more than twenty times its own weight to it. Even greater results have followed. For if we may believe one of the most distinguished chemists,* every pound of nitrogen which we add to the grass, increases the produce one hundred and ten pounds, and this increased produce of one hundred and ten pounds is effected by the aid of a little more than four pounds of gypsum, or plaster. Another accurate investigator—Sir Humphrey Davy—found by actual experiment that the ashes of an acre of red clover, contain no less than three bushels of plaster of Paris. This important fact proves that the earth already contains a large amount of this substance, and that it is essential to the growth of clover. This may, perhaps, explain the so-called clover sickness in some land. The requisite supply of plaster has been exhausted. In any case, the addition of plaster to clover lands, and especially to pastures, is of the highest importance.

The effect of charcoal is somewhat similar to plaster. Charcoal will absorb ninety times its own bulk of ammonia, which is held from escaping till it is separated by water and carried into the earth for the plant. When dry, the operation of fixing the gas is repeated till the next shower sends the gas into the earth, and the particles of water take its place in the charcoal. In this way, as a top-dressing, charcoal as well as plaster, performs the most important functions. If we take any decaying animal matter, which has begun to give off its offensive and noxious odor, its ammonia, and cover it with charcoal or plaster of Paris this escaping gas is immediately stopped. No infectious odor arises from it. The decay of the substance has suddenly ceased. This simple fact will show the intelligent farmer to what purposes these substances may be applied. His choice of these should depend somewhat on the expense of pro-

* Boussingault, Ann. de Ch. et de Phys. t. 43, p. 243.

curing them. The relative expense depends so much upon circumstances, that we need not make the estimate. As an absorbent and retainer of the valuable properties of manure, peat mud and loam will also be found of essential service. If used on a high and dry soil, the effect of plaster will not be very apparent the first season, unless like the past, there are frequent rains.

There is an impression among many that plaster does not produce so good results in the immediate vicinity of the sea shore. If this is so, it does not arise, probably, from the proximity to the sea, but from other causes. Many of our lands do not need the application of plaster. I have seen it used, to the best advantage, within two miles of the sea. If there were any thing in the sea air to prevent plaster from performing its usual functions as an absorbent, the effect would be perceived to a far greater distance inland. If any failures have occurred in its use in the vicinity of the sea, they were probably owing to the soil rather than to the atmosphere. There is one other remark in this connection. When plaster has been applied without immediate effect, we should not at once conclude that it is useless on the particular soil to which it is applied. The first season may be dry, and ill adapted to its decomposition. In such cases, good results have ordinarily followed the second year.

The great utility of bones as a manure, arises from the large amount of phosphates which they contain. On all pastures which have been long fed, the phosphate of lime is exhausted. It is constantly taken from the earth in the grass, to form the bone, the muscle, and the milk of animals. Of the earthy matter in bones, nearly five-sixths consist of phosphate of lime and magnesia. Nitrogen is also abundant, and, of course, ammonia, for nitrogen is an element of ammonia. A few bushels of bone dust will often quite restore old, "worn-out" pastures. Indeed, almost every part, of which bones are composed, goes directly to the nourishment of vegetable life. The ashes of all grains are very rich in phosphate of lime. This shows the importance of furnishing this element for their use.

A mixture of crushed bones and ashes, or leached ashes, forms a valuable top-dressing. Nor will this application, in small quantities, be thought expensive, if what is said be true,

that the animal part of bones, which amounts to about one-third, contains eight or ten times as much ammonia as the manure of the cow, and that the fertilizing salts in bones are sixty-six times the amount of a like quantity of the manure of the cow. So that a smaller quantity of bone dust will answer the purpose of a much larger quantity of manure from the stable. We can but hope that every farmer will try the experiment. It may be done on a small scale, at first, though in the vicinity of every butcher's establishment, bones can commonly be procured in any quantity.

Thus far I have spoken of manures which belong more peculiarly on the surface, as a top-dressing for grass. For though they are sometimes used, especially plaster, on ploughed land, with potatoes and other crops, yet their influence on the surface is thought to be far more effective. Indeed, the benefit of lime, plaster and charcoal, would, in a great measure, be lost were they to be buried to any depth in the earth. But there are other manures which are often used as top-dressings.

One of the best practical farmers of Hampden county, says: "I top-dress almost all of my mowing in the fall, cut two crops on all of them, and on some a third. I make a compost of earth and manure—make in the lot where it is used, by ploughing off a thin turf on the lower side of a small hill or knoll, taking the turfs to the hog-yard, and then cart from the stable three, five, or ten loads, or more, as I have the manure. Drop the manure upon the ground that the turf was removed from, then plough on the upper side of the hill and shovel two loads of earth upon each load of manure, beginning in the spring, so on through the season. As the manure of the barn increases, cart to the meadow, placing it upon the upper side of the first heap and plough and shovel as before. From one hundred loads of good stable manure it makes three hundred loads of good compost, and will make as much grass as so many loads of stable manure. For grass, put ten cart loads, per acre. Spread in the fall upon mowing, this compost makes more grass than green manure carted and spread upon mowing in the spring. In almost all cases the knoll or hill carted until it is level with the adjoining ground, produces more crop than before."

Another, in Berkshire county, says: "Top-dressing for mow-

ing lands is very beneficial, but too expensive, if barnyard manure alone is used, so much passes off by evaporation. A compost of one-half or two-thirds turf or swamp muck, and one-third good manure, is quite as beneficial to the land, and probably better or more enduring than all manure. If ashes are mixed in this compost it is all the better. But if stable manure alone or in compost is to be applied, it should be in autumn, so that the frosts of winter may incorporate it with the soil."

Another farmer, of great experience and observation, in Plymouth county, says: "I top-dress generally late in the fall, but should prefer early spring dressing, if we could cart on the fields without injury, and the time could be spared from other business. My land is chiefly of a cold, tenacious soil, and a compost is made of one-fourth stable manure and three-fourths light loam. For warm land peat mud would be used instead of the loam. Twenty common ox-cart loads, from thirty-three to thirty-five bushels each to the acre, is as small a dressing as can be judiciously applied. Double that quantity would not be excessive." A practical farmer, of Norfolk county, says: "With respect to top-dressing for mowing lands, I would state, that for several years we have been in the habit of raising from one to three acres of early potatoes for market. We have usually dug them early in August, and before the tops were dead. The tops are taken directly from the field, and spread on the mowing lands, to very great advantage. We think the tops from an acre of potatoes sufficient to top-dress an acre of mowing land, and the effect is equal to three or four cords of good manure."

The practice alluded to in this extract is worthy of a careful trial by those who are so situated as to adopt it. It is known that the tops of potatoes contain a large percentage of the organic elements of plants.

Fromberg found in 100 lbs. of the leaves in a natural state, from .82 to .92 per cent. of nitrogen, and that 100 lbs. of leaves dried contain from 5.12 to 5.76 per cent. of nitrogen. If his results are correct, and there is no reason to distrust them, we add to the land 50 lbs. of inorganic salts, besides nearly 20 lbs. of nitrogen among the organic constituents of every ton of potato tops. This would make a ton of them equal in value more than two tons of the best Ichaboe guano.

In a case which I have in mind, a very poor, worn out grass lot, was top-dressed with fourteen ordinary cart loads of good stable manure to the acre. The quantity of grass was increased fourfold. Clover and Timothy came in as luxuriantly as on any new laid piece. If the top-dressing were repeated once in five or six years, there would be no danger of exhaustion, though there would be an advantage in loosening the earth with the plough. But the use of stable manure should be confined mostly to mowing land. On closely fed pastures it would be injudicious, from its exposure to the sun. On these, ashes or plaster would be better.

An Essex county farmer says: "Peruvian guano, mixed with loam, is unquestionably the best manure for top-dressing that can be found. Ashes are very good for lands that are liable to be washed by the fall and early spring rains. I should think that the spring would be the best time to spread it, but on lands not so situated the fall would be more proper. In the latter case the manure would be entirely mixed in around the roots of the grass, and all the strength of the manure would remain in the ground."

An experienced and intelligent practical farmer, of Bristol county, says: "I top-dress moist mowing lands in winter or early spring, with eight or ten loads of fine manure, or with about 300 lbs. of guano, mixing the guano with twice its bulk of dry sand moistened with water containing about two ounces of sulphuric acid in solution to the gallon of water."

No farm should be managed without a compost heap, since it may be so made as to form an extremely valuable article for top-dressing. A quantity of meadow mud should be dug out in the autumn for this special purpose. Two cords of peat mud, added to one cord of good stable manure, will make, in the estimation of many practical farmers, a compost of three cords of valuable manure. This has been tried repeatedly, and is constantly done by those ambitious to excel in farming. To this compost heap should be added, from time to time, all the animal and vegetable matter adapted to ferment and enrich the soil. Woollen rags, the remains of fish, the blood and flesh of animals, the hair of animals, all these make an exceedingly rich manure. A most intelligent gentleman connected with a wool factory, informs me that a cord of matter collected at the establishment,

is worth at least five or six cords of the best stable manure, for a top-dressing. This we cannot doubt, for here are the blood, the wool, pieces of the skin of the animal, a little lime, and many other substances, all collected together. A fermentation takes place, by which the richest gases are formed. Such a compost heap, with an addition of loam and mud, would be invaluable for a top-dressing. But though in most cases all these substances cannot be procured, many of them can, and should be saved by every one who is desirous of improving his land. Those who are near the sea, or near the market, can procure an abundance of fish to add to the compost. Nothing is better for soils than this. A little lime added to the heap, causes its rapid and thorough decomposition. Ashes should also be added. When additions of manure are made, they should be covered with mud or loam, to prevent waste.

We need not enter more minutely into the details of forming the compost heap. It is sufficient to say, in a word, that every thing capable of fermentation should be added to it. The lower layer should be of loam or mud. Nothing is more common among farmers, on the death of a horse or any other animal, than to throw the body away. It is estimated by some, that the body of a single horse, when divided and mixed with peat mud and loam, will make a compost worth fifteen or twenty loads of the best and richest manure. This is, perhaps, too high an estimate, but animal substances ferment rapidly, or rather they may be said to putrefy without fermenting, so quick is their decomposition. If leaves, grasses, moss, straw and other substances of like nature, are used, lime will be useful in causing their rapid decay. When these are well fermented, the heap should be thrown over, and if made long and narrow, so as to expose the greater surface to the air, it will be the better.

The value of a compost, properly made, is greater than the aggregate value of the several ingredients applied separately, no matter what or how rich they may be. Besides, some divisor is needed for concentrated or other powerful manures, by means of which they may be more evenly and judiciously applied. Peat, or dry meadow muck, is one of the best and most available of these divisors, if properly prepared by exposure to the influence of air and frost. No good farmer would ever use lime in compost with barnyard manure or animal substances, unless

peat muck, gypsum or charcoal were largely used in the same mixture.

Animals fed on rich food make far the most valuable manure. This will serve, in part, to show why the manure from the sty is so fertilizing. Swine are fed on a great variety of rich food. The actual profit of raising them, arises mainly from the amount of substances they will mix together and make into good manure. If the sty be supplied, at intervals, with mud, loam, and other vegetable matter, the farmer will not complain of the cost of these animals.

Liquid manures are highly useful to grasses. Care should be taken to apply them, also, to the compost heap. The richness of manure from the sty is due to the quantity of liquid matter it contains. Hence the importance of adding a great variety of vegetable substances, loam, and mud. In a word, it may be said, that all liquid manures contain a large amount of nitrogen, which is one principal ingredient of ammonia, to which we have alluded. The importance of saving the liquid of the stable, either with the compost, or to be applied by itself, may be seen, also, in the fact that the exceeding richness of guano, and the manure of all fowls and birds, is due to the union of the liquids and solids.

After fermentation has taken place in animal manures, in the compost or elsewhere, they may be spread without much loss by evaporation, and hence it matters not whether the top-dressing is applied in the autumn or in the spring. Plaster is better spread in the spring, when the moisture of the earth makes it immediately available. Some prefer the autumn for spreading compost manures, while others prefer the spring, just before the thick grass surrounds and protects them from the sun and wind. The soil, in autumn, is not injured by the loaded cart, as is liable to be the case in spring. Others still, apply them after the first mowing, and before the summer rains. The new crop preserves the manure from drying up and wasting. This, however, is ordinarily too busy a season to attend to it with convenience.

We have then, these several methods of improving our pasture lands. First. To allow some of them to run to wood, or which is far better, to plant them with forest trees, which

should never have been entirely cut from them. This applies to poor, thin soils at a distance from the homestead.

Second. To plough and cultivate where this can be done on strong, good soils, which are not too stubborn and rocky. This applies to many lands which have been used as pastures time out of mind, the soils of which are naturally good, but have run out from neglect. Put soil into a good state of culture and rich and nutritive grasses will flourish as naturally as weeds. The former are nearly as spontaneous on good soils, as the latter are on poor ones. The success will depend chiefly on good culture if this mode is adopted.

Third. To scarify the surface thoroughly with a sharp tooth harrow, sowing on a suitable mixture of grass seeds spoken of above, and then harrow and brush over again, the work to be done in September or very early in spring, if the surface is hard enough to go over with cattle without too much poaching. This applies to old pastures covered with moss, where the sweet grasses are run out, but which from their particular location may not be desirable for woodland, nor pay for a more complete and careful improvement.

Fourth. To mix the grass seeds as evenly as possible with a finely divided compost and use it as a top-dressing, first harrowing the surface to loosen it, and after spreading the compost, brushing it over with a brush harrow to break up the lumps. This will cost a little more than the preceding method, but the grass seed will start sooner, make a larger and finer growth the first season and give greater satisfaction. This applies to very much the same class of lands as the preceding. In both cases, if the pasture, or any part of it is covered with bushes, they should of course be cut or grubbed up; if it is wet or covered with stagnant waters they should of course be drained off so as at least to leave a dry and healthy surface. It is unnecessary to say that the top-dressing should be free from weed seed, and be in a finely divided state. This method of improvement is perfectly practicable on thousands of acres which are now in a state both discreditable and unprofitable to their owners.

Fifth. To pasture sheep, turning in as many as the pasture will carry, stocking, in other words, pretty closely, for a few years. The first objection that many farmers raise to this method is, that the cost of fences is great, and that it is a branch

of husbandry with which they are not acquainted. This may be so, but the testimony of those who have tried this method is uniformly in its favor. I have had some experience and considerable observation in sheep husbandry, and my attention has been called to the changes wrought by sheep upon rough pastures covered with bushes and briars in part, and it appears to be a practicable method of improvement, while the raising of sheep and lambs for the shambles, is destined to be a profitable branch of farming.

Irrigation.—Another practicable means of improving our grass lands is by irrigation. Every casual observer, even, is familiar with the fact that lands are fertilized by irrigation, and especially that the grass by running streams shoots earlier in spring and makes a far more thrifty growth than lands on the same kind of soil which have not the advantage of running water. The introduction of the hydraulic ram among the implements of the farm, offers facilities for irrigating grass lands, not hitherto known, and it will unquestionably become hereafter an important means of guarding against our severe summer droughts, and of increasing vastly the production of our lands.

It would be impossible to state with any detail the different methods adopted to effect the objects of irrigation, since it would require a distinct treatise upon the subject, and it is sufficient to allude to the simplest mode employed with success, and the advantages offered.

Superficial irrigation, which is, perhaps, the oldest and the most common form in which water is artificially applied for the purpose of increasing the growth of grass, was undoubtedly suggested by observing the wonderful effects arising from the overflow of rivers. Remarkable examples of this are familiar to many, as the annual or periodical overflowing of the Nile, where the water without being left to stagnate upon the surface, is moving gently over it, depositing whatever alluvial matter it may hold in suspension. The extraordinary richness of the Valley of the Mississippi, and on a smaller scale, of the Valley of the Connecticut and other rivers, is mainly due, also, to this kind of irrigation; and this is imitated in our attempts to conduct the water over grass land by a system of shallow, open

drains, which take the water from its natural channel, keeping a constant flow without allowing it to accumulate in any part.

The process of surface irrigation is not so simple as many would suppose. It requires considerable skill and practice, and many failures have followed experiments of this kind, made without due care and attention. Sir John Sinclair, however, in speaking of this operation calls it one of the "easiest, cheapest and most certain modes of improving poor land in particular, if it is of a dry and gravelly nature. Land when once improved by irrigation is put into a state of perpetual fertility, without any occasion for manure or trouble of weeding, or any other material expense; it becomes so productive as to yield the largest bulk of hay, besides abundance of the very best support for ewes and lambs in the spring, and for cows and other cattle in the autumn of every year. In favorable situations it produces very early grass in the spring, when it is doubly valuable; and not only is the land thus rendered fertile without any occasion for manure, but it produces food for animals, which is converted into manure to be used on other lands, thus augmenting that great source of fertility."

The effect and value of irrigation does not depend altogether upon the artificial supply of moisture which it furnishes to the plant. "The mechanical action of the irrigatory current of water, in exercising the plants, strengthening their organisms, keeping their stems and root crowns clear of obstruction, promoting the equable circulation of water and oxygen around them, and causing an equable distribution of the soluble materials of their food, probably plays a considerable part in irrigatory fertilization. The differences of effect, from the mere circumstance of flowing or stagnation of the water, are prodigious; for while flowing water coaxes up the finest indigenous grasses of the climate, and renders them sweet and wholesome, and nutritious, and luxuriant, stagnant water starves, deteriorates, or kills all the good grasses."

The effect which surface irrigation produces on the nutritive qualities of the grasses may be seen by reference to the tables of analyses found in a preceding section.

This subject ought to receive the careful attention of the enterprising farmer. Even a farmer of very limited means may do

something each year towards improving his pasture lands. He may lessen the area of the bushes, he may plough up a small piece at least, and seed down at once with grass seed and winter rye, either in the spring or in the fall, and in either case his stock will fare enough better to pay for it, and the next year he may take another piece in the same pasture till the whole is finished, when it will carry more stock, and more stock will give him more manure, and more manure will increase the fertility of other lands, and increased fertility will add to his means of further improvement. The difficulty with most small farmers is to begin. Well begun is half well done, for the moment any real improvement is begun in earnest, the interest is excited, the mental activity is increased, the desire for improvement partakes the nature of a passion, and hence, though the beginning may be small, the ending may be the renovation of the owner as well as the land.

In concluding this special subject I have another suggestion to make as to the propriety of encouraging the collection of grasses for exhibition at the anniversary festivals of our agricultural societies. It would be an easy thing, I think, to engage many in this fascinating pursuit. Some, undoubtedly, would be interested by the simple suggestion, but the offer of small premiums for the largest and best arranged collection would induce others to attempt it who now want something to stimulate them to the work. The premium, however small, might afford the necessary stimulus, and if an interest were once excited, the subject would be still farther pursued, till many others were interested, while the collections, if properly named, would do much to disseminate a higher knowledge of the exhaustless riches of this class of plants.

"The royal rose—the tulip's glow—
The jasmine's gold are fair to see;
But while the graceful grasses grow,
O, gather them for me!

The pansy's gold and purple wing,
The snowdrop's smile may light the lea;
But while the fragrant grasses spring,
My wreath of them shall be!"

The farmers to whom reference has been made in the preceding pages, and to whom I am indebted for much valuable information on this subject, from every section of the State, are named in the following list, and I take this opportunity to make my acknowledgments to them.

Barnstable County—Brewster, E. Cobb; Eastham, E. E. Knowles; Truro, J. Small; Provincetown, G. Rider and O. Myrick; Wellfleet, E. Freeman.

Berkshire County—Adams, C. Bowen; Dalton, W. S. Booth; Egremont, J. H. Rowley; Florida, N. White; Mt. Washington, D. P. Turner; Monterey, E. Wright; New Ashford, P. Harmon; Richmond, W. Bacon; Sheffield, S. H. Bushnell and H. Allen; Sandisfield, J. M. Sears; Washington, F. W. Manley; Windsor, J. F. Wentworth.

Bristol County—Dartmouth, F. W. Mason; Fairhaven, J. M. Howland; Freetown, P. J. Tripp.

Dukes County—Chilmark, H. Vincent.

Essex County—Andover, W. Jenkins; Amesbury, J. H. Osborne; Boxford, M. Dorman; Georgetown, S. Nelson; Gloucester, T. Haskell; Lynnfield, J. Newhall and A. P. Chute; Methuen, Joseph Howe; Rowley, Thos. E. Payson; Salem, H. Wheatland; West Newbury, Moses Newell and D. Robinson.

Franklin County—Bernardston, P. L. Cushman; Buckland, S. L. Bardwell; Heath, B. A. Farnsworth; Leverett, D. Rice; Northfield, C. Hunter and T. J. Field; Orange, J. Goddard; Whately, J. M. Crafts.

Hampshire County—Belchertown, S. A. Shaw; Cummington, F. H. Dawes; Enfield, J. Holmes Howe; Easthampton, L. S. Clark; Granby, W. J. Patrick; Greenwich, Turner Sears; Hadley, Levi Stockbridge; Hatfield, G. W. Hubbard; Huntington, George Munson; Middlefield, E. Smith; Northampton, S. L. Parsons; Pelham, A. A. Rankin; South Hadley, Paoli Lathrop; Westhampton, Joel Cook; Worthington, J. Adams; Williamsburg, S. H. Clapp; Ware, S. Bowen.

Hampden County—Blandford, W. E. Boise and N. Atwater; Brimfield, Parsons Allen; Chester, J. J. Cook; Granville, Timothy M. Cooley; Montgomery, H. Bartholomew; Palmer,

Gamaliel Collins; Springfield, Geo. M. Atwater; Tolland, J. Slocum; Westfield, David Moseley; West Springfield, Aaron Bagg.

Middlesex County—Ashland, A. Allard; Acton, H. Holden; Bedford, J. P. Read; Chelmsford, Otis Adams; Concord, M. Pratt; Dracut, A. Clement; Framingham, Wm. Buckminster and W. G. Lewis; Lowell, J. Knowles; Medford, P. C. Hall; Newton, J. F. C. Hyde; North Reading, A. Flint; Shirley, G. Chandler; Stoneham, D. H. Burnham; Sudbury, A. Balcom; Somerville, J. C. Magoun; Townsend, Q. Sylvester and Luther Adams; Tewksbury, B. F. Spaulding; Tyngsborough, D. P. Coburn and Joseph Danforth; Westford, L. H. Hildreth.

Nantucket County—Nantucket, Edward W. Gardner.

Norfolk County—Braintree, B. V. French; Canton, A. Lopez; Dedham, W. K. Gay; Medfield, C. C. Sewall; Milton, Charles Breck; Randolph, J. Spear, Jr.; Stoughton, L. Clapp; West Roxbury, W. J. Taylor; West Needham, Robert Mansfield.

Plymouth County—Bridgewater, S. Leonard, Jr., and Jacob Bates; Carver, T. Vaughan; Hanover, W. Whitney; Hanson, I. Beard; Kingston, E. Willis and T. French; Pembroke, Morrill Allen and H. Collamore; Plymouth, J. Allen; Plympton, W. H. Soule; Scituate, G. M. Allen.

Suffolk County—North Chelsea, B. H. Dewing.

Worcester County—Athol, T. Townsend; Boylston, John Andrews, 2d.; Brookfield, O. C. Felton; Charlton, L. W. Curtis and J. Tucker; Clinton, S. Harris; Dana, O. N. Doubleday; Grafton, C. Brigham; Gardner, I. Whitney; Hardwick. Chas. Ruggles and Wm. Anderson; Harvard, A. G. Hill; Holliston, W. Miller; Lancaster, Benj. Willard; Leominster, J. Bennett; Lunenburg, C. Kilburn and J. P. Goodrich; Mendon, A. Taft; Millbury, J. E. Waters; Milford, C. F. Chapin; Northborough, G. C. Davis; North Brookfield, B. Nye; New Braintree, J. B. Bardwell; Oakham, M. Haskell; Oxford, J. P. Dana and D. Barton; Paxton, Solon C. Howe; Princeton, John Brooks and J. A. Reed; Royalston, P. Woodbury; South Royalston, E. Turner; Rutland, M. B. Smith; South Gardner, D. Bennett; Southborough, P. Fay; Sterling, E. Kendall; Shrewsbury, T. W. Ward; Templeton, G. Bushnell; Upton, W. Holbrook;

Worcester, Wm. Brigham, Jr.; Warren, R. T. Gleason; West Boylston, C. Goodale; West Brookfield, E. B. Taintor.

Replies were also received from many others in various sections, who omitted, inadvertently, to give their names. I am also indebted to many individuals for imperfect specimens of grasses, most of which were sent to be named. In such cases, it is desirable to send complete specimens, taken up with the root and stalk complete, and if possible, at the time of flowering, since then is the only time at which many of the species can be distinguished with absolute certainty. Grasses taken up in clusters and dried in the shade, will retain their beautiful green color, and are convenient for examination, but if dried between folds of soft or blotting paper, often changed at first, till they are dry, they keep longer and better.

I acknowledge with pleasure also, the receipt of a fine collection of grasses systematically named and arranged, from Prof. John Wilkinson, late of Great Barrington. Other specimens of various kinds have been received from different individuals, for deposit in the museum connected with my office. These will be arranged hereafter; or as soon as the room designed for them is suitably furnished, and will then be acknowledged in due form.

At a meeting of the Board of Agriculture held at the State House, on the second of December, 1856, the several Committees on the State Farm, submitted their reports, which were severally read, accepted and ordered to be printed.

The Committee on Labor, consisting of Messrs. Sprague and Phillips, presented the following

REPORT:

All the labor on the farm has been performed under the supervision of Dea. S. N. White, as head farmer. Fifteen men have been employed on the farm at different times during the year, of whom twelve have been hired by the month and three by the day. The largest number employed at any one time has been ten.

In the first four months of the year commencing December 1st, two men were employed by the month at $20 and board each, and two at $28 each, including board. In April, May and June, eight

men were employed, and in July nine; six by the month and three by the day. The wages paid were $23, $18 and $16 per month and board, and by the day, $1.50 and $1.75, including board.

For the remainder of the year, the number of men employed has varied from six to ten, at about the same wages. The price paid for board has been $3 a week. Boys from the State Reform School have been employed on the farm and about the stables to some extent all the time, and ten cents a day have been allowed for their labor. The number employed has varied from six or eight to one hundred and fifty at a time. The whole amount paid for their labor is $1,998.30, about two-thirds of the whole sum appropriated by the legislature, and placed at the disposal of the Board. The whole cost of labor done on the farm and for the State Reform School during the year, including the salary of the head farmer, and what has been paid for the labor of the boys and board of men, is $5,318.07, of which, $1,536 is chargeable to permanent improvements on the farm. This may appear to be a large sum to be expended on a farm no larger than the State Farm, at Westborough, in one year. To understand the matter fairly, it must be known that with the farm is connected the State Reform School for Boys.

There are usually in that institution, about six hundred boys, all sent there by order of court for some cause, and for the purpose of being reformed. It is important for the health and moral culture of the boys that they should, under proper rules and regulations, and under proper supervision, exercise in the open air to some extent, and to effect the object it is thought best to employ them on the farm and thus give them an opportunity to acquire some knowledge of farming; hence it is necessary to employ men who are not only capable of performing labor, but they must be men of character, proper to oversee, instruct and take care of the boys, men who can command higher wages than mere day laborers. The boys cannot be employed to any advantage except upon the light work, and then it frequently costs more to look after them, superintend their work, prevent their escape and keep them out of mischief, than it would to hire the work done. While your committee can appreciate the importance of giving the boys an opportunity to work on the farm, we cannot see any good reason why, under the circumstances, any thing should be paid for their labor.

It is said that the Reform School is a State institution, and that the farm also belongs to the State, and what is paid by one to the other is merely taking out of one pocket and putting into the other, and does not affect the final result. This, so far as the State is concerned,

is true, but the effect is unfavorable to agriculture and unjust to the Board. We pay a large sum of money partly to reform and educate the boys which is charged to expense of carrying on the farm.

If the legislature would appropriate a sum of money large enough to complete such permanent improvements on the farm as seem to be necessary, including the erection of suitable buildings to accommodate the men who must be employed there, and provide suitable persons to take care of the boys when they are at work on the farm, the Board of Agriculture would have an opportunity of expending the money placed at their disposal to advantage, of trying experiments in a proper manner, at reasonable cost, and of demonstrating whether farming can be done at a profit or not. But under the present system, there is danger that the object for which the State Farm was placed in charge of the State Board of Agriculture may be defeated.

IVERS PHILLIPS.

The circumstances of the farm are well alluded to in the above report, as somewhat peculiar. In the employment of labor, reference must constantly and of necessity be had to the good and the wants of the inmates of the State Reform School.

A large proportion of the one hundred and fifty boys worked on the farm are of an age at which their services are of little value over and above the cost of the high class of labor required to superintend, control and instruct them. Moreover, it is not possible to employ constantly so large a number of boys on work which will yield an immediate income, and many must be kept on permanent improvements, which, though important prospectively, as developing the resources of the farm, do not appear to swell the immediate profits of their labor, while they greatly swell the aggregate amount of the expenditures for improvements. With these facts in view, the amount asked for and required for the proper management of the State Farm will not appear to be large.

It will be noticed, too, by the report of the committee, that the Board are subjected to a high charge for labor in the shape of board of men employed on the farm. This arises from the want of a suitable farm house, a want which makes it necessary to board or lodge more or less of the men in the neighborhood instead of at the farm house, where they should and would be boarded if it were possible. This want would have been amply

supplied had the legislature seen fit to make the purchase of additional lands asked for two years ago.

The experiments made under the supervision of the Committee on Stock, consisting of Messrs. Brooks and Newell, have been conducted with extreme care and labor, and are of great interest and value. This committee submitted the following

REPORT:

The committee on stock report the following tabular statements, showing the cost, kind and weight of food consumed by the cows, and the quantity of milk given by each daily, for three hundred and sixty days. Twenty-four cows have been kept on the farm during this time; one has suckled a calf, the remaining twenty-three have been kept in milk as much of the year as possible. The milk afforded by these cows in three hundred and sixty days of trial, was 89,643 $\frac{21}{100}$ pounds, a quantity less, probably, than one-eighth of a quart daily, to each inmate and officer of the State Reform School. This very limited allowance is much less than should be furnished, and much less than might be advantageously consumed; but even this quantity cannot be furnished from the number of cows the farm will summer, and the committee, in order to keep the twenty-four cows, and afford the school as much milk as possible, have been obliged to rent pasturing to the amount of seventy-eight dollars. This is not as it should be, and the committee regret that the purchase of land recommended by the Board two years ago, was not consummated. If this purchase had been made at that time, we could now keep fifty or seventy-five cows, and furnish the inmates of the Reform School with a supply of milk much more in accordance with the wants of this class of persons than we now can.

The favorable season has afforded us a good hay and corn crop, and the fodder now in the barn is equal to the wintering of six or seven more cows than we now have, and the committee would have purchased them had the appropriation of funds by the legislature been equal to this outlay and the necessary expenses of the farm, but unfortunately, it was not, and your committee lament that an institution so creditable to the philanthropy of the State should be made to suffer by the parsimony of legislation.

There are now on the farm eighty-five swine of all ages, valued at six hundred and sixty-two dollars; and we have sold during the season forty-six hogs and thirty-seven pigs and shoats. The committee, in April last, finding the swill accumulating in larger quantities

than the swine then on hand could consume, purchased eleven shoats, for which they paid $139 $\frac{6}{100}$. For the support of the swine there have been fed to them, in addition to the swill from the institution, seventy-six bushels of Indian corn, and one hundred bushels of a mixture of small potatoes, turnips and apples.

The committee remarked in their report of last year, that they had been unfortunate in the loss of small pigs; they have since come to the conclusion that the swill, from some cause unknown to them, was unsuitable food for sows in milk, or pigs while weaning, and they adopted the plan of feeding the sows, when suckling, and the pigs when weaning, upon tea made of good English hay steeped in boiling water; this has, in a measure, remedied the evil, a less number having been lost since the change of food.

Of blood stock, the committee have purchased since their last report, one five years old Devon cow, for which they paid seventy-five dollars; she has a fine heifer calf, six months old, valued at twenty-five dollars; they also purchased a fine four years old Durham cow, and were negotiating for a beautiful Durham bull, both of which they were obliged to relinquish, for the want of funds to pay for them. The Jersey bull given the Board by the Hon. J. C. Gray, and the Jersey cow, Alice, presented the Board by the Massachusetts Society for Promoting Agriculture, have now been on the farm two years, have been fed and treated the same as the other stock; both have done well and have manifested their ability to endure the climate and treatment nearly, if not quite as well, as any stock on the farm. The cow has produced two calves, a bull and a heifer; the bull unfortunately met with an accident, which made it necessary to dispose of him at the low price of thirty dollars; the heifer is now six months old and is a fine animal, valued at twenty-five dollars. The Hereford cow and heifer purchased last year, both remain on the farm doing well under common treatment, evincing their ability to endure the climate quite as well as native stock.

The cow dropped in January last a bull calf which now weighs eight hundred and fifty pounds, and for size, beauty and symmetry of form, cannot be surpassed by any animal of his breed and age in the country; he can be sold any day for three hundred dollars. The committee have purchased within the year three native milch cows, one yoke of oxen, one horse, and sundry farming tools, for all of which the particulars will appear in the Secretary's Report.

John Brooks.
Moses Newell.

TABLE I.

Statements of average weight, gain and loss, of each cow, morning and evening, of January 1st and 20th, 1856, and the average for twenty days; also, age of cows, kind and quantity of daily feed consumed by each cow, in pounds and hundredths; average daily flow of milk in pounds and hundredths; daily per cent. of milk on live weight of each cow; number of days after calving, and average daily flow of milk of fourteen cows, for twenty days.

NAMES.	Av. morn'g and even'g weight, Jan. 1.	Av. morn'g and even'g weight, Jan. 20.	Average weight for 20 days.	Loss in weight.	Gain in weight.	Age.	Quantity of feed, in pounds and hundredths.				Av. daily flow of milk, in lbs. and hdths.	Daily per cent. of milk on av. live weight.	Number of days after calving.
							Meadow Hay, cut.	Corn Stalks, cut.	Carrots.	Shorts.			
Rosa, . .	1,013	940	976	73	–	11	8.87	8.87	20.00	0.58	17.87	1,83	50
Lady Devon, .	990	970	980	20	–	6	9.50	9.50	20.00	0.58	17.00	1.74	92
Spot, . .	953	912	932	41	–	8	8.43	8.43	20.00	0.48	20.54	2.20	2
Milly, . .	1,146	1,085	1,115	61	–	8	9.42	9.42	20.00	0.58	25.87	2.32	10
Chamberlin, .	1,082	1,065	1,073	17	–	9	10.56	10.56	20.00	0.58	15.12	1.41	30
Nora, . .	950	925	938	25	–	9	8.12	8.12	20.00	0.58	17.18	1.83	61
Dora, . .	1,092	1,033	1,063	59	–	9	9.75	9.75	20.00	0.58	22.75	2.14	17
Kendall, . .	1,142	1,150	1,146	–	8	10	9.60	9.60	20.00	0.58	1.42	0.12	285
Dolly, . .	1,222	1,260	1,241	–	38	12	10.80	10.80	20.00	0.58	9.12	0.74	186
Cherry, . .	926	939	932	–	13	7	7.87	7.87	20.00	0.58	4.00	0.43	210
Gentle, 2d, .	1,001	1,040	1,021	–	39	7	10.62	10.62	20.00	0.58	7.12	0.70	240
Redheifer, .	926	925	925	1	–	7	8.75	8.75	20.00	0.58	5.42	0.59	282
Nelly, . .	831	850	840	–	19	7	8.62	8.62	20.00	0.58	8.36	1.00	220
Alice, . .	995	965	980	30	–	6	6.18	6.18	20.00	0.58	6.75	0.70	184

Average daily flow of milk from the fourteen cows, in pounds and hundredths, . 12.75
Average number of days after calving, ... 133.50

The fourteen cows in this trial consumed 5,085.60 pounds of meadow hay and corn stalks, one-half each, 5,600 pounds of carrots, and 162 pounds of shorts.

Estimating the hay and stalks at ½ cent the pound, they will amount to . . $25 41
Carrots, at ½ cent the pound, ... 28 00
Shorts, at 1½ cents the pound, ... 2 43

Making the cost of keeping fourteen cows 20 days, ... $55 84

The same cows gave in 20 days, 3,570.40 pounds of milk, which cost 15.64 cents the gallon of ten pounds.

The food proved insufficient, and the fourteen cows lost in 20 days, 210 pounds in weight.

TABLE II.

Statements of Experiments continued with ten cows, from January 20th to February 9th, for twenty days.

NAMES.	Av. morn'g and even'g weight, Jan. 20.	Av. morn'g and even'g weight, Feb. 9.	Average weight, for 20 days.	Loss in weight.	Gain in weight.	Age.	Quantity of feed, in lbs. and hund'ths.			Av. daily flow of milk, in lbs. and hund'ths.	Daily per cent. of milk on av. live weight.	Number of days after calving.
							Meadow Hay.	Carrots.	Shorts.			
Rosa, ...	940	907	924	33	–	11	16.81	20.00	2.50	15.87	1.72	70
Lady Devon, . .	970	907	935	63	–	6	19.18	20.00	2.50	15.50	1.66	112
Spot, ...	912	870	891	42	–	8	16.06	20.00	2.50	17.68	1.98	22
Milly, ...	1,085	1,016	1,051	69	–	8	18.10	20.00	2.50	20.06	1.91	30
Chamberlin, . .	1,065	980	1,022	85	–	9	18.37	20.00	2.50	13.56	1.33	50
Nora, ...	925	920	923	5	–	9	19.06	20.00	2.50	15.56	1.69	81
Dora, ...	1,033	988	1,010	45	–	9	19.62	20.00	2.50	20.25	2.00	37
Gentle, 2d, . . .	1,040	1,050	1,045	–	10	7	19.62	20.00	2.50	4.25	0.40	260
Nelly, ...	850	955	902	–	105	7	17.00	20.00	2.50	4.87	0.54	240
Alice, ...	865	843	854	22	–	6	15.12	20.00	2.50	8.18	0.76	204

Average daily flow of milk from the ten cows, in pounds and hundredths, . . 13.57
Average number of days after calving, ... 110.06

Ten cows, in this trial, consumed in 20 days, 3,588.80 pounds of meadow hay, 4,000 pounds of carrots, and 500 pounds of shorts.

Estimating the hay at ½ cent the pound, it amounts to	$17 94
4,000 pounds carrots, at ½ cent the pound, ...	20 00
500 " shorts, at 1½ cents the pound, ...	7 50
Cost of keeping ten cows 20 days, ...	$45 44

The same cows gave, in 20 days, 2,715.60 pounds of milk, costing 16.72 cents the gallon of ten pounds.

The feed proving insufficient, the ten cows lost, in 20 days, 244 pounds of their weight.

TABLE III.

Statements of Experiments continued with eleven cows, from February 10 to February 29, for twenty days.

NAMES.	Av. morn'g and even'g weight, Feb. 10.	Av. morn'g and even'g weight, Feb. 29.	Average weight for 20 days.	Loss in weight.	Gain in weight.	Age.	Quantity of feed, in pounds and hundredths.				Av. daily flow of milk, in lbs. and hund'ths.	Daily per cent. of milk on av. live weight.	Number of days after calving.
							Husks and Stalks, cut.	Meadow Hay.	Carrots.	Shorts.			
Rosa, . .	907	943	920	–	36	11	13.42	4.42	20.00	2.50	16.50	1.79	90
Lady Devon, .	907	971	889	–	64	6	13.50	4.42	20.00	2.50	15.42	1.74	132
Spot, . .	870	866	868	4	–	8	13.12	4.36	20.00	2.50	16.81	1.92	42
Milly, . .	1,016	1,040	1,028	–	24	8	18.25	4.81	20.00	2.50	18.56	1.82	50
Chamberlin, .	980	1,005	993	–	25	9	15.62	4.68	20.00	2.50	13.81	1.39	70
Nora, . .	920	902	911	18	–	9	13.36	4.68	20.00	2.50	18.25	2.00	101
Dora, . .	988	1,000	994	–	12	9	15.50	4.68	20.00	2.50	19.18	1.91	57
Alice, . .	843	902	873	–	59	6	11.75	4.68	20.00	2.50	3.36	0.39	224
Redneck, . .	830	813	822	17	–	7	14.00	4.68	20.00	2.50	23.56	2.89	27
Delia, . .	969	976	968	–	16	9	14.00	4.42	20.00	2.50	20.50	2.11	30
Haywood, .	1,035	947	991	88	–	11	12.56	4.68	20.00	2.50	23.42	2.36	8

Average daily flow of milk from the eleven cows, in pounds and hundredths, . . 17.22
Average number of days after calving, ... 75.54

Eleven cows, in this trial, consumed in 20 days, 3,100.60 pounds corn stalks, 4,400 pounds of carrots, 550 pounds of shorts, and 1,010 pounds of meadow hay.

Estimating stalks at ½ cent the pound,			$15 50
4,400 pounds carrots, at ½ cent the pound,			22 00
550 "	shorts, at 1½ cent the pound,		8 25
1,010 "	meadow hay,		5 05
Cost of keeping eleven cows 20 days,			$50 80

The yield of milk from these eleven cows, in 20 days, was 3,787.40 pounds, costing 13.41 cents the gallon of ten pounds.

The cows in this trial, gained in 20 days, 109 pounds in weight.

TABLE IV.

Statements of Experiments continued with fourteen cows, from March 1 to March 20, for twenty days.

NAMES.	Av. morn'g and even'g weight, March 1.	Av. morn'g and even'g weight, March 20.	Average weight for 20 days.	Loss in weight.	Gain in weight.	Age.	Quantity of feed, in pounds and hundredths.				Av. daily flow of milk, in lbs. and hund'ths.	Daily per cent. of milk on av. live weight.	Number of days after calving.
							English Hay, cut.	Meadow Hay.	Carrots.	Shorts.			
Rosa, . .	943	1,030	985	–	87	11	16.18	2.00	20.00	2.50	18.00	1.83	110
Lady Devon, .	871	950	910	–	79	6	17.12	2.00	20.00	2.50	16.00	1.76	152
Spot, . .	866	918	892	–	52	8	16.75	2.00	20.00	2.50	17.42	1.95	62
Milly, . .	1,006	1,119	1,062	–	113	8	20.18	2.00	20.00	2.50	19.25	1.81	70
Chamberlin, .	1,005	1,020	1,012	–	15	9	19.25	2.00	20.00	2.50	15.50	1.53	90
Nora, . .	902	972	937	–	70	9	17.25	2.00	20.00	2.50	17.81	1.90	121
Dora, . .	1,000	1,022	1,011	–	22	9	19.37	2.00	20.00	2.50	19.50	1.93	77.
Redneck, . .	813	880	846	–	67	7	16.81	2.00	20.00	2.50	23.00	2.72	47
Delia, . .	976	1,035	1,005	–	59	9	17.68	2.00	20.00	2.50	19.93	1.98	50
Gentle, . .	911	970	941	–	59	11	15.75	2.00	20.00	2.50	21.56	2.29	18
Haywood, .	947	988	968	–	41	11	18.00	2.00	20.00	2.50	25.56	2.64	28
Whiteface, . .	815	845	830	–	30	7	16.87	2.00	20.00	2.50	27.93	3.36	5
Ida, . . .	795	815	805	–	20	6	16.81	2.00	20.00	2.50	23.12	2.87	10
Victoria, . .	963	1,058	1,010	–	95	5	16.81	2.00	20.00	2.50	7.68	0.76	270

Average daily flow of milk from the fourteen cows, in pounds and hundredths, . 19.45
Average number of days after calving, ... 79.30

The fourteen cows, in this trial, consumed, in 20 days—

4,894.60	pounds	of English hay, cut, estimated at $\frac{3}{4}$ cent the pound, . . .	$36 72
5,600	"	carrots, at $\frac{1}{2}$ cent the pound, ...	28 00
700	"	shorts, at $1\frac{1}{2}$ cent the pound, ...	10 50
560	"	meadow hay, at $\frac{1}{2}$ cent the pound, ...	2 80
		Cost of keeping fourteen cows 20 days, ...	$78 02

These fourteen cows gave, in 20 days, 5,445.20 pounds of milk, which cost 14.32 cents the gallon of ten pounds.

The gain in weight of the fourteen cows was 809 pounds in 20 days.

TABLE V.

Statements of Experiments continued with sixteen cows, from March 20 to April 9, for twenty days.

NAMES.	Av. morn'g and even'g weight, March 20.	Av. morn'g and even'g weight, April 9.	Average weight for 20 days.	Loss in weight.	Gain in weight.	Age.	Quantity of feed, in lbs. and hund'ths.			Av. daily flow of milk, in lbs. and hund'ths.	Daily per cent of milk on av. live weight.	Number of days after calving.
							Meadow Hay.	Carrots and R. bagas, ½ each.	Cob Meal.			
Rosa,	1,030	930	980	100	–	11	16.65	20.00	6.00	17.00	1.74	130
Lady Devon,	950	925	938	25	–	6	17.06	20.00	6.00	14.84	1.58	172
Spot,	918	860	889	58	–	8	17.00	20.00	6.00	15.03	1.69	82
Milly,	1,119	1,050	1,084	69	–	8	19.60	20.00	6.00	17.56	1.62	90
Chamberlin,	1,020	952	986	68	–	9	19.06	20.00	6.00	14.90	1.51	110
Nora,	972	920	946	52	–	9	17.11	20.00	6.00	16.57	1.75	141
Dora,	1,022	1,010	1,016	12	–	9	19.00	20.00	6.00	18.38	1.81	97
Kendall,	1,067	992	1,029	75	–	10	19.06	20.00	6.00	19.85	1.93	42
Redneck,	880	825	852	55	–	7	17.00	20.00	6.00	21.08	2.48	67
Flora,	1,020	965	992	55	–	7	17.70	20.00	6.00	31.21	3.15	30
Delia,	1,035	995	1,015	40	–	9	19.00	20.00	6.00	18.75	1.86	70
Gentle,	970	915	942	55	–	11	16.30	20.00	6.00	20.50	2.18	38
Haywood,	988	910	949	78	–	11	17.35	20.00	6.00	23.14	2.45	48
Whiteface,	845	730	787	115	–	7	16.70	20.00	6.00	25.41	3.23	25
Ida,	815	760	762	55	–	6	16.35	20.00	6.00	21.38	2.81	30
Victoria,	1,058	1,080	1,069	–	22	5	16.70	20.00	6.00	7.31	0.68	290

Average daily flow of milk from the sixteen cows, in pounds and hundredths, . 18.93
Average number of days after calving, ... 93.88

Sixteen cows, in this trial, consumed, in 20 days—

5,632.80	pounds	meadow hay, valued at ½ cent the pound, ...	$28 16
3,200	"	carrots, at ½ cent the pound, ...	16 00
3,200	"	ruta bagas, at ½ cent the pound, ...	16 00
1,920	"	cob meal, at 1¼ cents the pound, ...	24 00
		Cost of feed consumed in 20 days, ...	$84 16

The milk produced by these cows, in 20 days, was 6,058.20 pounds, which cost 13.89 cents the gallon of ten pounds.

Eight pounds of the hay were cut and mixed with 6 pounds of cob meal, and given in two feeds to each cow daily.

The feed in this trial proved less nutritious than that consumed in the last, and the cows lost in weight 890 pounds.

TABLE VI.

Statements of Experiments continued with sixteen cows, from April 10 to April 29, for twenty days.

NAMES.	Av. morn'g and even'g weight, April 10.	Av. morn'g and even'g weight, April 29.	Average weight for 20 days.	Loss in weight.	Gain in weight.	Age.	Quantity of feed, in lbs. and hund'ths.			Av. daily flow of milk, in lbs. and hund ths.	Daily per cent. of milk on av. live weight.	Number of days after calving.
							English Hay.	Carrots.	Cob Meal.			
Rosa, ...	930	895	912	35	–	11	13.85	20.00	6.00	14.39	1 59	150
Lady Devon, . .	925	900	912	25	–	6	14.61	20.00	6.00	13.78	1.52	192
Spot, ...	860	835	847	25	–	8	13.75	20.00	6.00	13.14	1.56	102
Milly, ...	1,050	1,050	1,050	–	–	8	17.98	20.00	6.00	16.83	1.60	101
Chamberlin, . .	952	955	953	–	3	9	17.84	20.00	6.00	12.63	1.32	130
Nora, ...	920	900	910	20	–	9	16.60	20.00	6.00	14.65	1.62	161
Dora, ...	1,010	980	995	30	–	9	18.97	20.00	6.00	16.93	1.71	117
Kendall, . . .	992	982	987	10	–	10	18.44	20.00	6.00	17 09	1.74	62
Redneck, . . .	825	800	812	25	–	7	15.00	20.00	6 00	17.78	2.20	87
Flora, ...	965	930	947	35	–	7	15.45	20.00	6.00	26.75	2.85	50
Delia, ...	995	973	984	22	–	9	16.30	20.00	6.00	13.60	1.70	90
Gentle, . . .	915	875	895	30	–	11	14.08	20.00	6.00	18.56	2.11	58
Haywood, . . .	910	887	898	23	–	11	15.53	20.00	6.00	18.86	2.11	63
Whiteface, . . .	730	707	719	23	–	7	15.32	20.00	6.00	19.31	2.71	45
Ida, ...	760	773	766	–	13	6	15.00	20.00	6.00	18.09	2.35	50
Star, ...	980	965	972	15	–	12	19.28	20.00	6.00	24 10	2.49	24

Average daily flow of milk from the sixteen cows, in pounds and hundredths, . 17.47
Average number of days after calving, ... 92.68

Sixteen cows, in this trial, consumed, in 20 days—

5,160	pounds	English hay, at ¾ cent the pound, ...	$39 70
1,600	"	carrots, at ½ cent the pound, ...	8 00
1,600	"	ruta bagas, at ½ cent the pound, ...	8 00
1,920	"	cob meal, at 1¼ cents the pound, ...	24 00
		Cost of feed for sixteen cows 20 days, ...	$79 70

The same cows gave of milk, in 20 days, 5,591 pounds, which cost 14.25 cents the gallon of ten pounds.

Eight pounds of the hay were cut and mixed with cob meal, and given twice a day

These cows lost, in 20 days, 314 pounds in weight.

TABLE VII.

Statements of Experiments continued with sixteen cows, from April 30 to May 19, for twenty days.

NAMES.	Av. morn'g and even'g weight, April 30.	Av. morn'g and even'g weight, May 19.	Average weight for 20 days.	Loss in weight.	Gain in weight.	Age.	Quantity of feed, in lbs. and hund'ths.			Av. daily flow of milk, in lbs. and hund'ths.	Daily per cent. of milk on av. live weight.	Number of days after calving.
							English Hay.	Carrots.	Indian Meal.			
Rosa,	895	952	923	–	57	11	14 56	10.00	6.00	14.31	1.57	170
Lady Devon,	900	915	907	–	15	6	14.75	10.00	6.00	13.87	1.63	212
Spot,	835	865	850	–	30	8	15.62	10.00	6.00	13.85	1.63	122
Milly,	1,050	1,075	1,062	–	25	8	16.87	10.00	6.00	19.06	1.80	130
Chamberlin,	955	930	943	25	–	9	16.93	10.00	6.00	15.25	1.62	150
Nora,	900	930	915	–	30	9	15.56	10.00	6.00	14.56	1.59	181
Dora,	980	978	979	2	–	9	18.38	10.00	6.00	17.87	1.83	137
Kendall,	982	1,008	995	–	26	10	18.25	10.00	6.00	18.62	1.87	82
Redneck,	800	817	809	–	17	7	15.56	10.00	6.00	18.62	2,30	10
Flora,	930	948	939	–	18	7	16.44	10.00	6.00	26.18	2.80	70
Delia,	973	995	989	–	22	9	17.87	10.00	6.00	17.12	1.74	110
Gentle,	875	885	880	–	10	11	16.00	10.00	6.00	19.25	2.19	78
Haywood,	887	948	917	–	61	11	15.38	10.00	6.00	19.25	2.10	88
Whiteface,	707	750	729	–	43	7	14.81	10.00	6.00	19.50	2.68	65
Ida,	773	780	776	–	7	6	14.81	10.00	6.00	17.50	2.24	70
Star,	965	968	967	–	3	12	18.03	10.00	6.00	24.50	2.53	44

Average daily flow of milk from the sixteen cows, in pounds and hundredths, . . . 18.08
Average number of days after calving, ... 107.44

In this trial, sixteen cows consumed, in 20 days—

5,196.40	pounds	English hay, at ¾ cent the pound,	$38 97
1,600	"	ruta bagas, at ½ cent the pound,	8 00
1,600	"	carrots, at ½ cent the pound,	8 00
1,920	"	Indian meal, at 1½ cents the pound,	28 80
		Cost of keeping sixteen cows 20 days,	$83 77

The same cows gave, in 20 days, 5,786.20 pounds of milk, costing 14.47 cents the gallon of ten pounds.

Gain in weight, of the sixteen cows, in 20 days, 337 pounds.

The whole loss of weight made by the cows, in these seven trials, was 1,658 pounds; the whole gain was 1,255 pounds; leaving a balance of loss in the 140 days, of 403 pounds. This loss is probably due to the change from green summer to dry winter feed. If so, it would appear that the feed consumed by the cows has been equal to sustaining them in the same condition they were in at the commencement of the 140 days' feeding.

The average cost, per day, for feeding each cow, in these trials of 140 days, was 24.62 cents.

TABLE VIII.

Statements of Experiments continued with sixteen cows, from May 19 to June 8, for twenty days.

NAMES.	Av. morn'g and even'g weight, May 19.	Av. morn'g and even'g weight, June 8.	Average weight for 20 days.	Loss in weight.	Gain in weight.	Age.	Feed—Pasture grass, only.	Av. daily flow of milk, in lbs. and hund'ths.	Daily per cent. of milk on av. live weight.	Number of days after calving.
Rosa,	952	990	971	–	38	11	–	17.31	1.80	190
Lady Devon,	915	960	938	–	45	6	–	16.31	1.74	232
Spot,	865	910	887	–	45	8	–	16.62	1.88	142
Milly,	1,075	1,088	1,081	–	13	8	–	23.50	2.17	150
Chamberlin,	930	943	937	–	13	9	–	15.18	1.62	170
Nora,	930	962	946	–	32	9	–	17.87	1.90	201
Dora,	978	980	979	–	2	9	–	20.81	2.12	157
Kendall,	1,008	1,025	1,016	–	17	10	–	21.50	2.11	102
Redneck,	817	885	851	–	68	7	–	22.87	2.70	146
Flora,	948	1,005	976	–	57	7	–	31.00	3.17	90
Delia,	995	1,015	1,005	–	20	9	–	17.68	1.76	130
Gentle,	885	955	920	–	70	11	–	22.00	2.40	98
Haywood,	948	960	954	–	12	11	–	20.38	2.13	108
Whiteface,	750	778	764	–	20	7	–	23.25	3.04	85
Ida,	780	790	785	–	10	6	–	19.31	2.21	90
Star,	968	990	979	–	22	12	–	26.44	2.70	64

Average daily flow of milk from the sixteen cows, in pounds and hundredths, . 20.75
Average number of days after calving, ... 134.69

These sixteen cows were the same as in the last trial. Their feed was pasture grass only. They increased their milk in 20 days, 853.86 pounds, or a fraction over 2.66 pounds daily for each cow. Estimating pasture land at forty dollars the acre, and five acres to the cow, the cost of keeping each cow would be the interest and taxes on five acres of land, valued at two hundred dollars.

Interest on two hundred dollars one year, ... $12 00
Taxes one year, ... 1 00

Cost of keeping one cow half a year, ... $13 00

Thirteen dollars divided by the number of days in half a year, gives 7.15 cents the day for keeping one cow, and $22.88 for sixteen cows 20 days.

These sixteen cows gave, in 20 days, 6,640.03 pounds of milk, which cost 3.46 cents the gallon of ten pounds.

The gain in weight, in this trial of sixteen cows, was 484 pounds.

TABLE IX.

Statements of Experiments continued with eighteen cows, from June 8 to June 28, for twenty days.

NAMES.	Av. morn'g and even'g weight, June 8.	Av. morn'g and even'g weight, June 28.	Average weight for 20 days.	Loss in weight.	Gain in weight.	Age.	Feed—Pasture Grass, only.	Av. daily flow of milk, in lbs. and hund'ths.	Daily per cent. of milk on av. live weight.	Number of days after calving.
Rosa,	990	995	992	–	5	11	–	17.88	1.80	210
Lady Devon,	960	920	940	40	–	6	–	15.74	1.67	252
Spot,	910	900	905	10	–	8	–	16.20	1.79	162
Milly,	1,088	1,102	1,095	–	14	8	–	24.22	2.20	170
Chamberlin,	943	937	935	6	–	9	–	15.22	1.63	190
Nora,	962	980	971	–	18	9	–	18.55	1.91	221
Dora,	980	1,010	995	–	30	9	–	21.51	2.16	177
Kendall,	1,025	1,000	1,012	25	–	10	–	22.17	2.19	122
Gentle, 2d,	1,095	982	1,038	113	–	7	–	39.18	3.77	26
Nelly,	713	715	714	5	2	7	–	23.66	3.31	92
Redneck,	885	867	876	18	–	7	–	23.43	2.68	166
Flora,	1,005	1,000	1,002	5	–	7	–	30.33	3.03	110
Delia,	1,015	1,040	1,027	–	25	9	–	16.83	1.64	150
Sawyer,	1,000	980	990	–	50	7	–	30.55	3.08	46
Haywood,	960	1,010	985	–	50	11	–	24.44	2.48	128
Whiteface,	778	800	789	–	22	7	–	24.55	3.11	105
Ida,	790	782	786	–	8	6	–	20.89	2.66	110
Star,	990	990	990	–	–	12	–	24.66	2.49	84

Average daily flow of milk from the eighteen cows, in pounds and hundredths, . 22.78
Average number of days after calving, ... 140.11

Eighteen cows, in this trial, gave 8,200.20 pounds of milk in 20 days—feed, pasture grass, only. Cost of keeping, for 20 days, $25.74. Cost of milk, in this trial, a fraction less than 3.20 cents the gallon of ten pounds.

The cows, in this trial of 20 days, gained in weight, 17 pounds.

TABLE X.

Statements of Experiments continued with twenty-three cows, from June 29 to July 18, for twenty days.

NAMES.	Av. morn'g and even'g weight, June 29.	Av. morn'g and even'g weight, July 18.	Average weight for 20 days.	Loss in weight.	Gain in weight.	Age.	Feed—Pasture Grass.	Av. daily flow of milk, in lbs. and hund'ths.	Daily per cent. of milk on av. live weight.	Number of days after calving.
Rosa, ...	995	995	995	–	–	11	–	16.92	1.70	230
Lady Devon, . . .	920	942	931	–	22	6	–	14.01	1.50	272
Spot, ...	900	917	908	–	17	8	–	14.80	1.62	182
Milly, ...	1,102	1,085	1,093	17	–	8	–	20.94	1.92	190
Chamberlin, . . .	937	915	926	22	–	9	–	13.30	1.44	210
Nora, ...	980	990	985	–	10	9	–	14.40	1.46	241
Dora, ...	1,010	1,027	1,018	–	17	9	–	16.60	1.63	197
Kendall, ...	1,000	1,045	1,022	–	45	10	–	20.56	2.01	142
Cherry, ...	887	905	896	–	18	7	–	20.06	2.24	50
Gentle, 2d, . . .	982	970	976	12	–	7	–	36 41	3.73	46
Redheifer, . . .	885	887	886	–	2	7	–	23.22	2.62	70
Nelly, ...	735	735	725	–	20	7	–	20.32	2.66	112
Alice, ...	870	880	875	–	10	6	–	26.90	3.07	37
Milton, ...	1,047	1,072	1,059	–	25	6	–	12.53	1.18	191
Redneck, . . .	867	892	879	–	25	7	–	20.10	2.29	186
Flora, ...	1,000	1,002	1,001	–	2	7	–	27.06	2.70	130
Delia, ...	1,040	1,065	1,052	–	25	9	–	15.22	1.45	170
Sawyer, ...	980	990	985	–	10	7	–	27.03	2.74	66
Haywood, . . .	1,010	1,045	1,027	–	35	11	–	21.65	2.11	148
Whiteface, . . .	800	805	802	–	5	7	–	22.56	2.81	125
Ida, ...	782	765	773	17	–	6	–	17.28	2.24	130
Star, ...	990	995	992	–	5	12	–	18.91	1.91	104
Victoria, ...	1,015	1,000	1,007	15	–	5	–	21.17	2.10	48

Average daily flow of milk from the twenty-three cows, in pounds and hundredths, 20.12
Average number of days after calving, ... 142.17

Cost of keeping twenty-three cows, in this trial, $32.89 for 20 days. The yield of milk of the same cows, was, in 20 days, 9,257 pounds, which cost 3.56 cents the gallon of ten pounds.

The twenty-three cows gained in weight, in 20 days, 210 pounds.

TABLE XI.

Statements of Experiments continued with twenty-two cows, from July 18 to August 7, for twenty days.

NAMES.	Av. morn'g and even'g weight, July 18.	Av. morn'g and even'g weight, Aug. 7.	Average weight for 20 days.	Loss in weight.	Gain in weight.	Age.	Feed—Pasture Grass, only.	Av. daily flow of milk, in lbs. and hund'ths.	Daily per cent. of milk on av. live weight.	Number of days after calving.
Rosa,	995	1,023	1,009	–	28	11	–	14.41	1.43	250
Lady Devon,	942	973	952	–	31	6	–	12.31	1.29	292
Spot,	917	931	924	–	14	8	–	13.24	1.43	202
Milly,	1,085	1,120	1,102	–	35	8	–	13.57	1.23	210
Chamberlin,	915	926	920	11	–	9	–	10.01	1.09	230
Nora,	990	967	978	23	–	9	–	7.10	0.73	261
Dora,	1,027	1,037	1.032	–	10	9	–	7.72	0.75	217
Kendall,	1,045	1,042	1,043	3	–	10	–	17.75	1.70	162
Cherry,	905	883	894	18	–	7	–	18.22	2.04	70
Gentle, 2d,	970	951	961	19	–	7	–	30.32	3.15	66
Redheifer,	887	867	877	20	–	7	–	19.98	2.28	90
Nelly,	735	742	739	–	7	7	–	18.03	2.44	132
Alice,	880	871	875	9	–	6	–	23.88	2.72	57
Milton,	1,072	1,073	1,072	–	1	6	–	10.12	0.95	211
Redneck,	892	908	900	–	16	7	–	15.72	1.76	206
Flora,	1,002	1,003	1,003	–	1	7	–	23.34	2.32	150
Delia,	1,065	1,072	1,068	–	7	9	–	14.24	1.33	190
Sawyer,	990	977	983	13	–	7	–	23.01	2.34	86
Haywood,	1,045	1,036	1,040	9	–	11	–	17.65	1.70	168
Whiteface,	805	821	813	–	16	7	–	19.46	2.40	145
Ida,	765	778	771	–	13	6	–	13.71	1.77	150
Star,	995	1,002	998	–	7	12	–	16.06	1.62	124

Average daily flow of milk from the twenty-two cows, in pounds and hundredths, 16.36
Average number of days after calving, ... 171.31

Twenty-two cows, in this trial, gave, in 20 days, 7,197 pounds of milk. Feed, pasture grass, only. Cost of keeping twenty-two cows 20 days, estimating pasture grass as in former trials, $31.46, making cost of milk, in this trial, 4.37 cents the gallon of ten pounds.

The cows, in this trial, gained 61 pounds in weight.

TABLE XII.

Statements of Experiments continued with twenty-one cows, from August 8 to August 28, for twenty days.

NAMES.	Av. morn'g and even'g weight, Aug. 7.	Av. morn'g and even'g weight, Aug. 27.	Average weight for 20 days.	Loss in weight.	Gain in weight.	Age.	Feed—Pasture Grass & 20 lbs green corn fod'r.	Av. daily flow of milk, in lbs. and hund'ths.	Daily per cent. of milk on av. live weight.	Number of days after calving.
Rosa, ...	1,023	1,052	1,037	–	29	11	–	12.35	1.18	270
Lady Devon, . .	973	1,005	989	–	32	6	–	9.49	0.95	310
Spot, ...	931	945	938	–	14	8	–	11.81	1.26	222
Milly, ...	1,120	1,155	1,137	–	30	8	–	9.74	0.86	230
Chamberlin, . . .	920	937	929	–	17	9	–	8.77	0.94	250
Kendall, ...	1,043	1,040	1,041	3	–	10	–	16.99	1.63	182
Cherry, ...	883	880	877	–	7	7	–	16.63	1.90	90
Gentle, 2d, . . .	951	932	941	19	–	7	–	26.34	2.80	86
Redheifer, . . .	867	847	857	20	–	7	–	17.70	2.07	110
Nelly, ...	742	750	746	–	8	7	–	17.21	2.31	152
Alice,	871	862	866	9	–	6	–	20.59	2.38	77
Milton, ...	1,073	1,075	1,074	–	2	6	–	7.34	0.68	231
Redneck, . . .	908	925	916	–	17	7	–	11.03	1.20	226
Flora, ...	1,003	1,005	1,004	–	2	7	–	20.78	2.07	170
Delia, ...	1,072	1,080	1,076	–	8	9	–	10.96	1.02	210
Sawyer, ...	977	965	971	12	–	7	–	20.94	2.05	106
Haywood, . . .	1,033	1,027	1,031	9	–	11	–	15.62	1.52	188
Whiteface, . . .	821	837	829	–	16	7	–	17.82	2.15	165
Ida, ...	778	792	785	–	14	6	–	9.50	1.21	170
Star, ...	1,002	1,010	1,006	–	8	12	–	13.22	1.31	144
Victoria, ...	1,008	1,017	1,012	–	9	5	–	14.54	1.44	88

Average daily flow of milk from the twenty-one cows, in pounds and hundredths, . 14.73
Average number of days after calving, ... 175 09

Twenty-one cows, in this trial, gave daily 309.37 pounds of milk. In 20 days, their yield was 6,187.40 pounds. The feed was pasture grass, and twenty pounds each cow, daily, of green corn fodder. The corn fodder was considered by the Committee to no more than make up for the deficiency, occasioned by the dry weather, in the pasture feed, and the cost would probably be no more than grass. So the cost of keeping would be $1.43 each cow, for 20 days, or $30.03 for twenty-one cows 20 days, making the cost of the milk in this trial, 4.85 cents the gallon of ten pounds.

The cows, in this trial, gained 142 pounds in weight.

TABLE XIII.

Statements of Experiments continued with twenty-one cows, from August 28 to September 16, for twenty days.

NAMES.	Av. morn'g and even'g weight, Aug. 28.	Av. morn'g and even'g weight, Sept. 16.	Average weight for 20 days	Loss in weight.	Gain in weight.	Age.	Feed—Pasture Grass & 20 lbs green corn fod'r.	Av. daily flow of milk, in lbs. and hund'ths.	Daily per cent. of milk on av. live weight.	Number of days after calving.
Rosa,	1,052	1,080	1,066	–	28	11	–	8.93	0 84	290
Lady Devon,	1,005	995	1,000	10	–	6	–	7.29	0.73	330
Spot,	945	955	950	–	10	8	–	11.13	1.17	242
Milly,	1,155	1,185	1,170	–	30	8	–	8.21	0.70	250
Chamberlin,	937	980	957	–	43	9	–	9.66	1.00	270
Kendall,	1,040	1,054	1,047	–	14	10	–	11.87	1.43	202
Cherry,	830	885	872	–	25	7	–	15.57	1.79	110
Gentle, 2d,	932	972	952	–	40	7	–	24.74	2 60	106
Redheifer,	847	882	864	–	35	7	–	13.72	1.94	130
Nelly,	750	797	773	–	47	7	–	13.75	1.16	170
Alice,	862	880	871	–	18	6	–	20.46	2.34	97
Milton,	1,075	1,097	1,086	–	22	6	–	6 60	0.55	251
Redneck,	925	935	945	–	40	7	–	6.32	0.68	246
Flora,	1,005	1,035	1,020	–	30	7	–	18.74	1.84	190
Delia,	1,080	1,070	1,075	10	–	9	–	7.73	0.72	230
Sawyer,	935	957	951	8	–	7	–	21.37	2.22	126
Haywood,	1,027	1,047	1,037	–	20	11	–	15.00	1.54	208
Whiteface,	837	895	866	–	58	7	–	17.12	2.00	185
Ida,	792	820	806	–	28	6	–	8.20	1.03	190
Star,	1,010	1,020	1,015	–	10	12	–	10.60	1.05	164
Victoria,	1,017	1,032	1,025	–	15	5	–	13 23	1.29	108

Average daily flow of milk from the twenty-one cows, in pounds and hundredths, . 13.32
Average number of days after calving, ... 195.00

In this trial, the twenty-one cows gave, daily, 279.79 pounds of milk. Their yield for 20 days was 5,595.80 pounds. The feed was pasture and twenty pounds each, daily, of green corn fodder, the same as in the last trial. The cows were the same, and their feed for 20 days cost $30.03, the same as in the last trial, but there was a falling off in milk, and the cost in this 20 days is 5.36 cents the gallon of ten pounds.

In this 20 days, the cows gained in weight, 485 pounds.

TABLE XIV.

Statements of Experiments continued with sixteen cows, from September 17 to October 6, for twenty days.

NAMES.	Av. morn'g and even'g weight, Sept. 17.	Av. morn'g and even'g weight, Oct. 6.	Average weight for 20 days.	Loss in weight.	Gain in weight.	Age.	Feed estimated equal to good pasture grass.	Av. daily flow of milk in lbs. and hund'ths.	Daily per cent. of milk on av. live weight.	Number of days after calving.
Spot,	955	955	955	–	–	8	–	8.16	0.85	262
Chamberlin,	980	965	972	15	–	9	–	7.43	0.76	290
Nora,	950	950	950	–	–	9	–	15.00	1.58	23
Kendall,	1,054	1,045	1,049	9	–	10	–	11.53	1.10	222
Cherry,	885	867	876	18	–	7	–	13.87	1.60	130
Gentle, 2d,	972	922	947	50	–	7	–	18.12	1.91	126
Redheifer,	882	865	875	17	–	7	–	12.91	1.48	150
Nelly,	797	767	782	30	–	7	–	7.67	0.88	190
Alice,	880	857	868	23	–	6	–	16.76	1.93	117
Flora,	1,035	1,005	1,020	30	–	7	–	13.39	1.21	210
Sawyer,	957	930	943	27	–	7	–	18.89	2.00	146
Haywood,	1,047	1,010	1,028	37	–	11	–	13.51	1.31	228
Whiteface,	895	897	896	–	2	7	–	9.90	1.10	205
Ida,	820	820	820	–	–	6	–	4.15	0.51	210
Star,	1,020	965	992	55	–	12	–	5.00	0.50	184
Victoria,	1,032	1,027	1,029	5	–	5	–	11.12	1.08	128

Average daily flow of milk from the sixteen cows, in pounds and hundredths, . 11.71
Average number of days after calving, ... 176.31

The yield of the sixteen cows, in this trial, was 187.41 pounds of milk daily, equal to 3,748.20 pounds in 20 days.

Cost of keeping, estimating the aftermath to be no more than equal to good pasture, $1.43 each cow, for twenty days, making $22.88 for sixteen cows 20 days. Cost of milk, 6.14 cents the gallon of ten pounds.

Loss in weight, of the sixteen cows, in this twenty days' trial, 314 pounds.

TABLE XV.

Statements of Experiments continued with fifteen cows, from October 7 to October 27, for twenty days.

NAMES.	Av. morn'g and even'g weight, Oct. 7.	Av. morn'g and even'g weight, Oct. 27.	Average weight for 20 days.	Loss in weight.	Gain in weight.	Age.	Feed estimated equal to good pasture grass.	Av. daily flow of milk, in lbs. and hund'ths.	Daily per cent. of milk on av. live weight.	Number of days after calving.
Spot,	955	970	962	–	15	8	–	7.66	0.79	282
Chamberlin,	965	975	970	–	10	9	–	7.86	0.81	310
Nora,	950	953	951	–	3	9	–	15 68	1.65	43
Kendall,	1,045	1,153	1,074	–	58	10	–	11.40	1.09	242
Cherry,	876	878	877	–	2	7	–	13.21	1.51	150
Gentle, 2d,	922	940	931	–	18	7	–	18.13	1.95	146
Redheifer,	865	997	831	–	32	7	–	13.33	1.60	170
Nelly,	767	793	780	–	26	7	–	14.57	1.87	210
Alice,	857	855	856	2	–	6	–	16.64	1.94	137
Flora,	1,005	1,020	1,012	–	15	7	–	9.87	0.98	230
Sawyer,	930	938	934	–	8	7	–	17.74	1.90	166
Haywood,	1,010	1,018	1,014	–	8	11	–	13.67	1.35	248
Whiteface,	897	895	896	2	–	7	–	8.99	1.00	225
Star,	965	990	977	–	25	12	–	7.38	0.76	204
Victoria,	1,027	1,035	1,031	–	8	5	–	10.56	1.03	148

Average daily flow of milk from the fifteen cows, in pounds and hundredths, . 12.45

Average number of days after calving, ... 194.13

Fifteen cows gave, in this trial, 186.69 pounds of milk daily. In 20 days, their yield was 3,733.80 pounds. Cost of feed, equal to good pasture, $1.43 for each cow, 20 days; for fifteen cows, 20 days, $21.45. Cost of milk, 5.72 cents the gallon of ten pounds.

The cows gained, in this 20 days' trial, 257 pounds.

TABLE XVI.

Statements of Experiments continued with sixteen cows, from October 27 to November 16, for twenty days.

NAMES.	Av. morn'g and even'g weight, Oct. 27.	Av. morn'g and even'g weight, Nov. 16.	Average weight for 20 days.	Loss in weight.	Gain in weight.	Age.	Feed—Past'e and aftermath, estimated equal to good pasture.	Av. daily flow of milk in lbs. and hund'ths.	Daily per cent. of milk on av. live weight.	Number of days after calving.
Spot, ...	970	988	979	–	18	8	–	4.02	0.41	302
Chamberlin, . . .	975	1,018	996	–	43	9	–	6.13	0.62	330
Nora, ...	953	1,018	985	–	65	9	–	13.13	1.33	63
Dora, ...	1,008	1,018	1,013	–	18	9	–	21.54	2.12	24
Kendall, ...	1,103	1,090	1,096	13	–	10	–	5.50	0.50	262
Cherry, ...	878	910	894	–	32	7	–	10.37	1.16	170
Gentle, 2d, . . .	940	940	940	–	–	7	–	9.13	0.97	166
Redheifer, . . .	997	928	963	69	–	7	–	9.32	0.97	190
Nelly, ...	793	810	801	–	17	7	–	11.19	1.40	230
Alice, ...	855	898	876	–	43	6	–	13.17	1.50	157
Flora, ...	1,020	1,090	1,055	–	70	7	–	4.55	0.43	250
Sawyer, ...	938	990	964	–	52	7	–	9.41	0.98	186
Haywood, . . .	1,018	1,047	1,032	–	29	11	–	8.15	0.80	268
Whiteface, . . .	895	938	916	–	43	7	–	5.27	0.58	245
Star, ...	990	1,030	1,010	–	40	12	–	7.49	0.74	224
Victoria, ...	1,035	1,080	1,057	–	45	5	–	8.07	0.76	168

Average daily flow of milk from the sixteen cows, in pounds and hundredths, . 9.15
Average number of days after calving, ... 202.13

The sixteen cows, in this trial, gave 146.40 pounds of milk daily. In 20 days, their yield was 2,928 pounds. The cost of keeping, for each cow, was the same as in the last trial, making, for sixteen cows, $22.88 for 20 days. Cost of milk, a fraction over 7.81 cents the gallon of ten pounds.

The gain of weight, in this trial, was 433 pounds.

TABLE XVII.

Statements of Experiments continued with eleven cows, from November 16 to December 6, for twenty days.

NAMES.	Av. morn'g and even'g weight, Nov. 16.	Av. morn'g and even'g weight, Dec. 6.	Average weight for 20 days.	Loss in weight.	Gain in weight.	Age.	Feed—In lbs. and hund'ths.		Av. daily flow of milk, in lbs. and hund'ths.	Daily per cent. of milk on av. live weight.	Number of days after calving.
							Corn stover, 5 days.	Corn stover, 15 days, with past're grass.			
Nora,	1,018	950	984	68	–	9	17.40	8.00	12.26	1.24	83
Dora,	1,018	992	1,005	26	–	9	17.95	8.00	20.11	2.00	44
Kendall,	1,090	1,125	1,107	–	35	10	18.50	8.00	4.25	0.38	282
Cherry,	910	905	908	5	–	7	17.90	8.00	7.65	0.84	190
Gentle, 2d,	940	1,030	985	–	90	7	20.80	8.00	8.36	0.85	186
Redheifer,	928	918	923	10	–	7	17.60	8.00	8.72	0.95	210
Nelly,	810	782	796	28	–	7	20.75	8.00	9.74	1.22	250
Alice,	898	895	896	3	–	6	19.20	8.00	11.60	1.30	177
Sawyer,	990	1,015	1,002	–	25	7	19.00	8.00	6.05	0.60	206
Star,	1,030	1,096	1,063	–	66	12	25.70	8.00	4 55	0.43	244
Victoria,	1,080	1,090	1,085	–	10	5	17.00	8.00	6.79	0.62	188

Average daily flow of milk from the eleven cows, in pounds and hundredths, . 9.10
Average number of days after calving, ... 187.27

Eleven cows, in this trial, gave, daily, 100.08 pounds of milk, or, in 20 days, 2,001.60 pounds.

The same cows consumed, the fifteen first days, while at grass, 1,320 pounds of corn stover, and in the five days, in the barn, they consumed 1,059 pounds of corn stover. In 20 days they consumed—

2,379 pounds corn stover, estimated at ½ cent the pound, ... $11 89
15 days in pasture, estimated at 7 cents the day, ... 11 55

Cost of keeping eleven cows 20 days, ... $23 44

Cost of milk, in this trial, 11.71 cents the gallon of ten pounds.

Gain in weight, 86 pounds in 20 days.

TABLE XVIII.

Statements of Experiments continued with seven cows, from December 6 to December 26, for twenty days.

NAMES.	Av. morn'g and even'g weight, Dec. 6.	Av. morn'g and even'g weight, Dec. 26.	Average weight for 20 days.	Loss in weight.	Gain in weight.	Age.	Feed.		Av. daily flow of milk, in lbs. and hund'ths.	Daily per cent. of milk on av. live weight.	Number of days after calving.
							Husks and Stalks, lbs. and h'dths.	Roots, ($\frac{2}{3}$ Carrots, $\frac{1}{3}$ Rutabagas,) 20 lbs. daily.			
Nora,	950	935	942	15	–	9	20.60	20	10.96	1.16	103
Dora,	992	957	975	35	–	9	20.86	20	16.41	1.68	64
Cherry,	905	940	922	–	35	7	20.25	20	4.47	0.49	210
Redheifer,	918	927	923	–	17	7	20.04	20	6.85	0.74	230
Nelly,	782	810	796	–	28	7	17.23	20	8.38	1.05	270
Alice,	895	867	881	28	–	6	19.52	20	7.66	0.87	197
Victoria,	1,090	1,050	1,070	40	–	5	19.20	20	6.28	0.68	280

Average daily flow of milk from the seven cows, in pounds and hundredths, . 8.72
Average number of days after calving, ... 183.00

Seven cows, in this trial, gave, daily, 61.01 pounds of milk; in 20 days, their yield was 1,200.20 pounds.

The same cows consumed, in 20 days—

2,754 pounds husks and corn stalks, at $\frac{1}{2}$ cent the pound, ... $13 77
2,800 " roots, ($\frac{2}{3}$ carrots and $\frac{1}{3}$ ruta bagas,) at $\frac{1}{2}$ cent the pound, . . . 14 00

Whole cost of keeping seven cows 20 days, ... $27 77

Cost of milk, in this trial, 22.75 cents the gallon of ten pounds.
Loss of weight, in 20 days, 38 pounds.

RECAPITULATION OF THE EIGHTEEN TRIALS.

Number of days embraced in all the trials, ... 360
Average number of cows milked daily, ... 15.72
Whole gain in weight of all the cows, ... 3,430 pounds.
Whole loss in weight of all the cows, ... 2,010 "
Balance of gain, ... 1,420 "
Average daily flow of milk from each cow, in pounds and hundredths, . 15.84
Total flow of milk from all the cows, in pounds and hundredths, . 89,643.23
Total cost of feed of all the cows, ... $759 30
Total cost of feed, per gallon of milk of ten pounds, ... 08.47
Daily cost of keeping each cow, when wholly kept in the stable, or barn, . . 24.30
Daily cost of keeping each cow, when kept wholly at pasture, ... 07.15
Daily cost of keeping each cow, five days in barn and fifteen in pasture, . . 10.65
Daily cost of keeping each cow, during all the trials, ... 13.41
Average number of days after calving, ... 144.11

The circumstances of the farm with respect to its connection with the State Reform School, and the importance and necessity of furnishing work for a large number of boys, having been explained in the report of the Committee on Labor, it is not necessary to repeat that many of the permanent improvements on the farm are undertaken for the purpose of furnishing employment for the boys, and that though the amount of expenditures by the Committee on Improvements appears to be large, the labor of each boy being credited at ten cents a day of six hours, yet the actual cost to the State is far less, even when viewed from a pecuniary point of view, to say nothing of the absolute necessity, in a moral point of view, of employing the boys in the open air and in healthy exercise.

The committee having charge of this department submitted the following

REPORT:

The committee on permanent improvements would respectfully offer to the Board of Agriculture their annual report of disbursements, for their approval.

1st. As per account of labor in repairing the reservoir and drain at the institution, setting gate posts, repairing farm-house and old walls, . . .	$51 15
2d. Labor in constructing a road to the new reservoir, west of the grove, by men and teams, . .	$403 65
925 days' labor by boys, at 10 cents per day of 6 hours, ...	92 50
	$496 15
3d. Labor in front of farm-house to barn lane, and from road to path leading from farm-house to barn, blasting stones, labor by men and ox teams, ...	$265 49
912 days' work by boys, at 10 cents, . . .	91 20
Blacksmith, $23; powder for blasting, $10, . .	33 00
	$389 69

4th. Labor on field No. 1, prepared and contemplated for a garden, work done previous to Dec. 1st, 1855,	$80 00
Labor since Dec. 1st, 1855, by men and teams,	582 05
6,400 days' work,	448 00
Powder, $4; repairing of tools, $2,	6 00
Cost of tile, and freight,	100 00
2,500 tins to cover joints,	12 50
	$1,228 55

Labor on lot No. 1,	$1,228 55
Labor on lot No. 2, costing,	495 15
Labor on lot No. 3, "	389 69
Labor on lot No. 4, "	51 15
	$2,164 54

The getting out of stone, drawing them off and grading of the ground south of the farm-house, which has long been desired, and is justly charged to the account of permanent improvements, is nearly finished. Labor to the amount of about $150 will complete this work, so that it can be ploughed quite well seven inches deep or laid down to a lawn which will be a beginning to a similar finish, till all the ground will become a fine grass lawn; never intending to remove the stone for the plough, but to remove all unsightly objects from the front of the institution to the lake. This will improve the appearance of the farm very much.

Amongst permanent improvements, none claims our consideration more than the garden. With the advice of the Board, your committee have laid out a garden, of about three acres, near the road and adjoining the lane leading to the barn. This is well located; but your committee found this lot, like most of the farm, abounding in stone: these have all been removed, the ground trenched two feet in depth and drained by Albany Tile, emptying into the large stone drain west of the garden, and emptying into a ravine south of the garden; the loam has been carefully mixed while trenching. One large cart-way has been laid out, twelve feet in width, from the road through the garden, underlaid with stone and covered with gravel. Round this garden and at a distance of twelve feet from the east and west ends, are paths of six feet in width, leaving fine borders; also, on the north side is a large plat in which we contemplate to set out choice garden fruit trees, and through the garden are two paths running

from east to west underlaid with stone and covered with gravel. This garden, which contains, without the paths, two and nine-tenths acres, or in all, three acres, has been all drained as follows: on the ground north of the wide passage way they have been laid thirty inches deep, and with a fall of two to three feet in twenty-two rods, and twenty-three and a half feet distance. Those south of the large gate-way are twenty-eight feet distance and forty-two inches deep. A description of this soil as it was found while trenching, will be annexed to this report for future reference, with a view to witness with accuracy the effect of deep and shallow draining in different soils, as some of this garden is of a fine sandy loam, while a portion is of coarse gravel. It will require about $50 in labor to finish this garden. Your committee have agreed to have a wall laid with stone taken from front of the farm-house, laid on the east line of the tool-house. When this work, as well as that in front of the farm-house shall have been completed, we may say that some progress has been made in permanent improvements, never to be done again; but while they shall be approved, they will, we trust, be admired for time to come, advising observers what may be done or omitted on a large or small scale, in thorough draining or trenching of land.

B. V. French.
Sam'l Chandler.

At the same meeting, also, the Committee on Crops and Fertilizers, consisting of Messrs. Wilder and Bartlett, to whom was intrusted the entire direction of this department, presented the following

REPORT:

In the spring the committee gave Dea. White, the farmer, specific directions as to the crops and the system of cultivation to be adopted. Herewith we subjoin a statement of the process, and the amount of the products harvested.

Before proceeding further, it is proper to remark, that much embarrassment has been experienced by the Board in consequence of the inadequate appropriation made by the legislature for the well-conducting of the farm, or for the interest—as it seems to the Committee—of the Commonwealth. It should also be borne in mind that by the contract between the Trustees and the Board, the latter are under obligation to employ a large number of the boys of the State Reform

School, and at a price which exhausts very considerably the appropriation. Hence the necessity of delaying the experiments and improvements originally designed by the Board, and of raising only such products and in such quantities as were required for the use of the institution, as the only means of meeting the expenses of the year.

While your committee have kept constantly in mind the wants of the institution, they have endeavored, so far as the means placed in their hands would admit, to make trial of such fertilizers as could readily be obtained, with a view not only of supplying the deficiency of stable manure, but at the same time to test their adaptation to certain crops, their comparative value, and in some instances, their durability and effect on a similar crop on the same soil for a series of years.

The nature and constitution of soils, their origin and diversity of character, and the causes of their productiveness, are subjects not well understood, and require deep and thorough investigations. If we knew what fertilizers would best promote the growth of crops, and what kind and quantity must be given to each particular crop, we should be possessed of the most important secret in profitable cultivation. Unfortunately, we do not often possess this most essential information and frequently administer manures which are absolutely unsuited to the wants of the plant. There are, however, elements in virgin soil which give the first crops a luxuriance seldom obtained in subsequent harvests. Chemists inform us that this can be maintained for a succession of years, and have undertaken to define not only the constituents of soils and crops, but to prescribe the necessary fertilizers for each particular crop,—that where the soil is deficient, or deprived of them, as upon exhausted fields, they can be supplied, and the fertility not only maintained but increased. It has therefore been a matter of the first importance to test this theory, become acquainted with the effects of the various fertilizers in use, the best methods of application, and to ascertain whether by any system of special manuring we can restore to the soil the elements which have been carried off in the crops.

The rapid increase in the price and consumption of guano, superphosphates and other concentrated manures in this country, and the thousands of acres of exhausted lands in the Middle and Southern States which have been made fertile by their application, has confirmed the theory of special manuring, and awakened a general interest among the cultivators to ascertain their real merits as economical fertilizers. This should not excite surprise when we consider that

the cost of them is frequently less than the expense of carting out and applying stable manures.

To test these fertilizers on the State Farm, some of the crops have been planted on the same land for three years in succession, the results of which will be seen in the subjoined statements. Let none however imagine, that we underrate the importance of stable manures. They are the natural and appropriate fertilizers of the soil, and should, therefore, be sedulously accumulated and carefully preserved; and here let us instance the great advantage of keeping manures under cover. By an experiment in England, such manures produced 30 per cent. more in the first crop, (potatoes,) and in the succeeding one, (wheat,) 25 per cent. more than manure exposed to the weather. Stable manures are adapted to all soils; but, in relation to guano and other concentrated fertilizers, we are inclined to believe that much of their influence and future effect depend upon the season, and physical condition of the soil. Some soils are organically better able to retain the elements of fertility than others, and consequently will be less depreciated by continued cropping. Such, for example, are clayey, deep, loamy lands, of a close texture. It is upon them we may expect more lasting benefits, than upon soils of a light, silicious character. But to both of these soils, stable manures are well adapted; to the former for their mechanical effect, and to the latter in adding materials which serve as absorbents of the dews, rains and ammonia. Much depends, no doubt, on meteorological and other influences not well understood, varying in different seasons; nor can experiments be fully confirmed in one, two, or three years. Some inferences, however, may be drawn from the trials already made, as will appear by this report.

In the following experiments it will be seen that the stable composts have generally taken the lead;* also that a mixture of these with guano, used before heating, has operated favorably; and that liquid manure from the reservoir has proved the cheapest fertilizer used. The committee regretted exceedingly that the means to be expended did not permit of a more extensive use of this liquid, believing as they do, that if it could be properly distributed over the fields with suitable carriages, or conduits, the quantity made at the institution, would in time not only completely restore the exhausted condition of the farm, but would impart to the lands a high state of fertility and largely increase the crops.

* The barnyard compost was composed of 120 bushels of loam, 40 bushels of swamp muck and 220 bushels of stable manure, and when composted was estimated to be worth three dollars per cord of 102 bushels.

The proper distribution of this liquid as an economical fertilizer, containing, as it does, most of the valuable salts necessary for the growth of plants, and richer in excrementitious elements than stable manure, is scarcely less in importance than the proper distribution of it as a sanitary measure.

The aggregate of the crops on the State Farm for the year ending November 30, 1856, as reported by S. N. White, the head farmer, is as follows:—

Corn, shelled,	1,470	bushels.
Rye,	66	"
Oats,	60	"
Beans,	27½	"
Peas,	16	"
Total,	1,639½	
Potatoes,	1,326	bushels.
Carrots,	1,914	"
Beets,	266	"
Onions,	205	"
Turnips,	659	"
Total,	4,370	
Of English hay, first crop,	68¾	tons.
" second crop,	10	"
Willard's bromus,	1¼	"
Millet,	1	"
Meadow hay,	22	"
Total,	103	

The crop of hay was the best ever cut on the farm. Guano, Gould's muriate of lime and plaster were applied as a top-dressing. In the fall of 1854, the English mowings were furnished with compost from the barnyard and old reservoir, and spread in the spring. The summer being dry, no special benefit was derived. The heavy snow of last winter, followed by a wet spring, contributed largely to the crop and rendered it difficult to estimate the influence of the special fertilizers used in the spring.

One-half acre—exhausted—was dressed with 100 pounds of guano, and instead of 300 pounds of hay as heretofore, produced 1,200

pounds of clover and Timothy. Another half acre was dressed with 100 pounds of guano, and the crop doubled. Two lots of an acre each were dressed with 200 pounds of guano each, and one yielded an increase of 120 per cent. over the preceding year; and on the other the crop was doubled. The guano was mixed with loam and sown in wet weather.

Three-fourths of an acre were dressed with two barrels of Gould's muriate of lime—$1 per barrel. The land was turf-bound, produced light crops of June grass the two preceding seasons. It produced a ton and a half of hay, well mixed with clover and Timothy. The muriate was sown broadcast from the barrels.

Twelve acres of clover were dressed with plaster, 100 pounds per acre, and produced a fine crop.

Willard's bromus, or chess, (*bromus secalinus*,) stood until July, then cut and cured, instead of being used green as last year. If the land is in good condition it will produce three crops a year, being much more valuable than when allowed to mature and cured as hay. It is not then more than half the value of English hay.

An acre and a half were sown with millet, a part cut and fed green, part reserved for seed, and the rest cut and cured as hay. It was a good crop.

About an acre of meadow that received the wash from the reservoir was cut early in June. It consisted chiefly of reed canary grass, (*phalaris arundinacea*,) and though cut just as it was heading, it was badly lodged. It yielded about two and half tons per acre; and early in August it was mowed again and produced another ton of good hay. It produced a third crop in October, thus indicating that it suffered nothing from early cutting. Some of this grass that was left to mature grew to the height of about eight feet and was full of ergot, demonstrating the necessity of early cutting for making hay.

Note.—It will be perceived by these statements that the effect of guano on grass is favorable. These experiments confirm the opinions heretofore expressed, especially so of old fields that have been cropped a long time without ploughing, and tend to establish the economy of its use on grass land. This fertilizer, especially in moist seasons, produces a luxuriant growth, and thus by the decay of the after crop, increases the quantity of humus in the soil. This is particularly beneficial in attracting from the atmosphere and holding in store the nutritive materials required for vegetation, and it is upon this principle that we account for the enduring influence of guano on grass lands, on those which are rich in humus.

The following additional testimonies in favor of guano for dressing grass lands are from other sections of the State :—

An old field that had not been tilled nor manured for sixteen years was dressed with guano four years ago, at the rate of 300 pounds per acre. The first year the crop was more than doubled, the second tripled, and the last two years, has maintained about the same relative advantage over its former condition, as demonstrated by the un-manured land by its side.

A reclaimed swamp seeded with grass six years ago, has continued to produce large crops, and still retains that peculiar verdure which guano or liquid manuring always impart.

A plat on which empty guano bags were spread three years since, and suffered to remain through the winter and spring, gives strong evidence of the durability of this fertilizer. The spots where the bags were spread, being yet distinctly marked.

Gould's muriate of lime, reinforced with night soil, as seen, produced good effects on grass lands. See foregoing statement.

Corn Crop of 1856.—Thirty-five acres, besides sweet and fodder corn, were planted. The yield was 2,940 bushels of ears, estimated at 1,470 bushels of shelled corn, an average of 42 bushels per acre.

Experiments in Manuring Corn Lands—Fertilizers all spread and ploughed in:—

No.		Acres.	Cost of Manures.	Total Bushels.	Sound Corn.	Soft Corn.	Weight of Stover.
1	Barn compost, 8⅓ cords, .	1	$25 00	100	94	6	3,205
2	Guano, ...	1	15 00	88	68	20	2,010
3	Potash, dissolved and mixed with coal ashes, . .	1	15 00	73	68	5	1,885
4	Mapes' super-phosphate, .	1	15 00	44	26	18	1,585
5	De Burg's " .	1	15 00	57	43	14	1,565
6	Barn compost, $7; Gould's muriate of lime, $8, .	1	15 00	82	75	7	2,190
7	Liquid manure from reservoir, at cost of carrying out—2 acres, av. per acre,	1	5 00	88	82	6	Not weighed.

The first six acres, in the order of numbering, have been planted three years in succession with corn, and manured with the same kind of fertilizers as this year, except No. 3, which was guanoed in 1854. In 1854–5 the fertilizers were used in the hill, but this year mixed with moist loam and sown broadcast in damp weather and covered with the harrow.

The corn came up well and grew thriftily until the first of August, when an unfavorable change became apparent. On No. 1, the ears were large, long and sound. Upon 2, 3, 4, 5, the corn was not so good. No. 6, was sound and handsome, but not equal to No. 1.

No. 7 was manured with two dressings, one before ploughing, of 45 loads per acre, of 326 gallons, and the other of 30 loads at the time of the second hoeing. Until August, the corn looked very inferior. It now put on a thrifty appearance.

No. 8. Two acres were manured with barn cellar compost, $8\frac{1}{3}$ cords per acre, spread and ploughed in. The yield was 77 bushels of ears per acre. This piece of land had been planted six years with corn, and last year was only manured with a compost of swamp muck, cornstalks and waste with lime, which will account for its deficiency.

No. 9. Two acres were manured also with $8\frac{1}{3}$ cords of barn cellar compost, and 150 pounds of guano per acre, and produced 146 bushels of ears per acre. The corn was large and sound.

No. 10. Two acres were manured with $8\frac{1}{3}$ cords of barn cellar manure per acre, yield 123 bushels of ears per acre. Nos. 7, 8, 9, 10, have been planted to corn three years in succession, and $8\frac{1}{3}$ cords of barn cellar manure were applied per acre, each year, spread and ploughed in, with the exception of No. 9, which, last year received $6 worth of barn cellar manure and 300 pounds of super-phosphate lime. The field of fourteen acres, was ploughed nine inches deep, planted in hills three feet by two and a half apart, May 28th and 29th, with "smutty white," or Plymouth corn, thoroughly hoed three times, harvested and measured with results as stated.

Five acres, called the Sibley lot, produced a crop of rye last year. It was manured with stable compost and guano and produced 366 bushels of ears of corn. The land is inferior to that on the plain, not easy of access, and has, therefore, been lightly manured in former years.

Another lot of three acres, "the old rye field," has, hitherto, been lightly manured. This year, 10 cords of reservoir compost were applied, and planted to Connecticut River corn, and produced 210 bushels of long, full and hale ears of corn—70 per acre.

Three and a fourth acres of land were rented of Mr. Brigham,

manured with 8⅓ cords of best barn cellar compost per acre, spread, ploughed in, and planted May 23d, with King Philip corn, and yielded 273 bushels of ears of corn, or 84 bushels of ears per acre. The stalks were small and the corn ripened early.

Another lot of seven acres of old pasture was manured with 300 pounds of guano per acre, planted May 20th and 21st with Brigham corn and produced 607 bushels of ears of corn, or 86⅝ bushels of ears per acre, manure never having been applied to this land.

Two acres manured with piggery compost, 6⅔ cords per acre, spread, ploughed in, furrowed three feet apart one way, and the other way one acre four feet apart; and the other, eighteen inches. On the former acre five stalks stood in a hill, and the other, three. Both were planted the same day, one with a hoe and the other with Randall's corn planter; both hoed three times. The corn was all good, and that produced on that part of the field planted four and a half feet apart was better filled and every way superior to the other.

Of the thirty-five acres of corn twenty-four were cut up and shocked, eleven topped; and in every lot, says the farmer, the corn was better with the former mode of harvesting than the latter.

The corn was all measured in the ear.

The following statements exhibit the results produced by the application of the various fertilizers to the same land, on the corn crops, for the years 1854–5–6.

Corn on the Plain, six lots of one acre each.

Expense of fertilizers per acre, 1854, ... $10 00

No.	Bush. of Ears per Acre.
1. Reservoir manure,	87
2. and 3. Guano,	72
4. Mapes' super-phosphate,	85
5. De Burg's super-phosphate,	101
6. Bones, ground,	90

Expense of fertilizers per acre, 1855, ... $12 00

No.	Bush. of Ears per Acre.
1. Stable compost,	99
2. Guano, (corn did not come up well,)	59
3. Potash,	70
4. Mapes' super-phosphate,	86
5. De Burg's super-phosphate,	72½
6. Muriate of lime,	65

For experiment of 1856, see page 269.

Synopsis of the three years, in their order, giving the number of bushels of ears of corn per year.

No.	1854. Bushels.	1855. Bushels.	1856. Bushels.
1. Stable compost,	87	99	100
2. Guano, . .	72	59	88
3. Guano, . .	72	Potash, 70	Potash, 73
4. Mapes' super-'te,	85	86	44
5. De Burg's "	101	72½	57
6. Bones, ground,	90	Muriate of lime, 65	Manure & M. of lime, 88

Note.—In relation to the fertilizers used for corn, stable manures have been, and will continue to be, appropriate. Guano mixed with these and ploughed in before heating, has proved beneficial, by giving an excess of 23 bushels of ears of corn for 150 pounds of guano. See experiments Nos. 9 and 10. The application of guano to the old pasture, which had never been manured, as seen, produced exceedingly good results, as in the seven acres of the Brigham lot, and would seem to warrant its application by farmers to such land, as a very cheap fertilizer, if $9 worth per acre, as in this case, produces 87 bushels of ears of corn per acre.

The liquid manure of the reservoir, containing, as it does, most of the salts necessary for the growth of crops, and being richer in excrementitious matter than barnyard compost, is both a very cheap and valuable fertilizer. It is, therefore, of the utmost importance that all made at the institution should be economically and promptly applied.

Oats.—An acre and a half, highly manured and planted to corn last year, was guanoed broadcast at the rate of 300 pounds per acre, ploughed in, sowed April 30th, produced 60 bushels of oats, averaging 40 per acre. It was seeded down and the grass looks well.

Rye.—Seven acres of light land sowed to spring rye, from which was taken a crop of winter rye the preceding season. Previous to sowing the ground was top-dressed as follows:—

Lot No. 1. Two acres, 600 pounds guano, and produced 22 bushels, or at the rate of 11 bushels per acre.

Lot No. 2. Two acres, 400 pounds of guano, and produced 20 bushels, or 10 bushels per acre.

Lot No. 3. Three acres, 200 pounds of guano, and produced 24 bushels, or 8 per acre.

The guano was composted with loam before sowing, and harrowed in. The rye was sown early and looked well, but was blighted, the crop being light both of straw and grain.

Potatoes.—Seventeen acres were planted to potatoes, and produced 1,326 bushels—at the rate of 78 bushels per acre.

Two and a half acres of the Smith lot, were planted with the St. Helena, manured with 500 pounds of guano per acre, and produced 156 bushels of inferior potatoes; they were much injured by the rot. The guano was applied broadcast, unmixed, on a wet day, and covered with a cultivator.

Five acres of the same lot were planted to Davis's seedling, manured at an expense of $12 per acre, in lots of half an acre each, with the following kinds of manures, and results.

No.	Whole No. Bush.	Bush. Small.
1. No manure,	33	13
2. Stable compost,	77	11
3. Manure and guano—equal expense,	72	5
4. Guano,	29	8
5. Mapes' super-phosphate,	33½	8½
6. De Burg's super-phosphate,	34	9
7. Potash dissolved and mixed with coal ashes,	55	8
8. Lodi poudrette,	37½	10½
9. Liebig poudrette,	41	9
10. Manure, $2, with muriate of lime, $4,	54	5½

These experiments with the fertilizers of equal cost, per acre, ($12,) show the following results, per acre.

	Bushels per Acre.
Stable compost,	154
Stable compost and guano,	144
Potash with coal ashes,	110
Muriate of lime and manure,	108
Liebig poudrette,	82
Lodi poudrette,	75
De Burg's super-phosphate,	68
Mapes' super-phosphate,	67
No manure,	66
Guano,	58

This land was planted with potatoes last year and yielded a fine crop. The same kind of fertilizers were used generally as last year, but the lots were differently divided, and in some respects gave certain advantage of some fertilizers over others. No such advantage existed this year. They were planted early and hoed three times. The vines held green much longer on lots 2, 3 and 10, than on the others.

The St. Helena variety on the first lot, as already stated, were affected with the rot. On the west part the potatoes did not suffer

from the disease, and though small, were of good quality. The Warren lot was planted to "peach blows," and yielded 156 bushels of inferior and diseased potatoes, less than one-half of them being suitable for table use. This lot was fertilized with guano, phosphates and manure from the reservoir. On the plain, around the corn field, 150 bushels of good potatoes, of different varieties, were produced. On three acres of new land, rented of Mr. Brigham, never ploughed before, were planted the Jenny Lind, Riley, Long Red and Worcester seedling, fertilized with 300 pounds of plaster per acre, and a crop of 301 bushels of fine potatoes harvested. One-half acre of Chenangoes was planted, but so injured by the rot that no further statement is made.

An acre and a quarter below the farm house has been planted to the same variety three years in succession, as an experiment, with an annual application of 300 pounds of guano per acre—in 1854–5 in the hill, and in 1856 spread on. The produce this year, 74½ bushels of inferior potatoes; in 1855, 119 bushels; and in 1854, 189½ bushels.

The season has been a bad one for potatoes, and in some instances they have done quite as well without manure as with it. The above experiments are therefore not so reliable as they would have been under more favorable circumstances. In relation to guano on the same land for a series of years, it will be seen that the trial on the lot below the farm house, has resulted in a failure, and leads to the belief that this fertilizer cannot be depended on for a course of years for the potato, without some other adjunct as a manure.

Carrots.—Five acres were sown to the white and orange varieties and produced 47 tons and 1,700 pounds, equal to 1,914 bushels, of 50 pounds per bushel.

Experiments with Four Acres on the "Old Carrot Bed," the Orange Variety, with the comparative view of Crops for three years.

For 1856—

Lot 1.—1 acre,	$26 worth reservoir compost,	513 1/10 bush.
2.—¾ acre,	$15 worth potash, at the rate of	416 bush. per acre.
3.—¾ acre,	$15 worth Coes' sup. phosp'e, at the rate of	390 bush. "
4.—¾ acre,	$15 worth Mapes' sup. phosp'e, " "	371 bush. "
5.—¾ acre,	$15 worth De Burg's sup. phos'e, " "	313 bush. "

For 1855—

Lot 1.—1 acre,	$30 worth barn compost,	463 bush.
2.—1 acre,	$12 worth potash,	469 bush.
3.—1 acre,	$12 worth Mapes' super-phosphate,	491 bush.
4.—1 acre,	$12 worth De Burg's super-phosphate,	512 bush.

For 1854—

Lot 1.—1 acre, $12 worth guano,	. . . . .	660 bush.
2.—1 acre, $12 worth Mapes' super-phosphate,	. .	572 bush.
3.—1 acre, $12 worth De Burg's super-phosphate,	. .	585 bush.
4.—1 acre, $12 worth potash,	. . . . .	628 bush.
5.—1 acre, $12 worth barn compost,	. . . .	753 bush.

Note.—This field had been cropped with carrots for seven years. The present season has not been generally favorable for carrots, but aside from this, there seems to have been a gradual decline in the crop. It is, however, noticeable, that potash and the composts of manure have sustained themselves best.

This year, the manure and fertilizers were spread and ploughed in to the depth of twelve inches. The carrots grew well until August 1st, when blight became apparent, and the carrots were rather small, but sound and good.

One acre, field No. 1, was divided and manured as follows: One-half acre manured with 400 pounds guano, spread on and ploughed in, produced 2 tons and 1,800 pounds, equal to 116 bushels. One-half acre manured with $6\frac{2}{3}$ cords of piggery compost, produced $2\frac{1}{2}$ tons. This lot is not well adapted to carrots, and the seed did not come up well, hence the reasons for a small crop.

Turnips.—Two and three-fourths acres were sown to ruta bagas, French, purple-top and English turnip seed, and produced 659 bushels. Turnip seed was sown among the corn at the last hoeing, but proved a failure. The ruta bagas were inferior, though manured with piggery compost at the rate of $6\frac{2}{3}$ cords per acre.

Beets.—One-half acre was sown to the turnip and mangold wurzel varieties, on the Brigham lot, manured with piggery compost at the rate of $6\frac{2}{3}$ cords per acre. 150 bushels of leached ashes were harrowed in after ploughing, and the crop was 128 bushels, 113 of which were mangold wurzel, and 25 of the turnip variety.

Onions.—One acre on the plain, manured with 10 cords of reservoir compost and 300 bushels of leached ashes, spread and ploughed in five inches deep, the ashes harrowed in; the ground was rolled and planted May 7th, and in consequence of poor seed, the crop was only 205 bushels.

Beans.—Two acres were planted and manured, one acre with 300 pounds of Mapes' super-phosphate, in the hill, produced 12 bushels. The other acre was manured with 300 pounds of Coe's super-phosphate, and produced $15\frac{1}{2}$ bushels.

Pease.—Three-eighths of an acre were sowed April 24th, and produced 16 bushels of good pease.

Cabbages.—The cabbage crop was nearly a failure. Three-fourths of an acre in the garden, in front of the institution, were set with cabbage, and produced only 2,000 heads fit for the market.

Rhubarb, Celery and Asparagus.—Good crops were produced, as demonstrated by sales to the institution.

Fruits.—But few apples were raised, and of inferior quality; only 23 barrels fit for market.

There was a fine crop of peaches, pears, quinces, and grapes, most of which were sold to the institution.

The area of strawberry culture was diminished; the crop small but of good quality.

The raspberries were large and abundant.

Sweet and Fodder Corn.—Three acres were planted, one to sweet corn, the produce gathered and sold to the institution for table use. The remaining two acres yielded 7 tons green fodder per acre; was cut and fed to the cows during the summer. It was manured from the reservoir.

The root crop showed indications of blight early in August, especially the carrots and the potatoes; the latter suffered very materially, but not worse than on the adjoining farms. The pasturing rented of J. C. Gilman, 38 acres, produced well. The 19 acres rented of Mr. Brigham yielded a net profit to the Board of more than $300.

Marshall P. Wilder.
J. C. Bartlett.

After the reading of the reports, a committee was appointed, consisting of Messrs. Wilder, Newell, Chandler, Lewis, and the Secretary, to petition the legislature for the usual annual appropriation for the farm for 1857.

It was voted to recommend that careful experiments be made in the cultivation and uses of the Chinese sugar cane at the farm during the coming year. It was voted also, to suggest to the county agricultural societies the expediency of offering premiums by way of encouraging experiments in raising this plant.

A delegation was appointed, consisting of Messrs. Wilder,

Poore, Newell, Lewis, and the Secretary, to attend the annual meeting of the United States Agricultural Society, to be held in Washington on the 14th of January, 1857.

At the same meeting, a committee was appointed, consisting of Messrs. Bartlett, Brooks, Lewis and Page, to consider the advantages and the evils connected with the exhibition and trials of speed of horses in connection with the exhibitions of our agricultural societies, and to report at a subsequent meeting of the Board. At the annual meeting, held at the State House on the 6th of January, 1857, this committee accordingly presented the following

REPORT:

It would be a work of supererogation on our part to make an argument to prove the vast utility of the horse in almost every department of business, or the propriety of his exhibition in connection with other animals raised by the farmer. Nor do we understand that serious objections are raised by any one, to the general proposition. If the farmer has for sale an animal which is valuable as a draught horse, there can surely be no reason why his strength and endurance should not be exhibited in competition with others, as well as the powers of working oxen, and no more excitement in the public mind would be produced in the one case than in the other. The real evils flowing from an exhibition of horses, if any, must be connected with the trials of speed, and to this point we feel that the whole matter for us to consider, is narrowed down.

The tendencies of our age are peculiarly "fast" in all directions. How much of this condition of things in general, has resulted from the high speed of railroads, your committee leave to be determined by the moralist; but we conceive that the prevalent taste for fast horses has had its origin chiefly in this source, as he who becomes accustomed to an easy speed of twenty-five or thirty miles per hour in the cars, will not be long satisfied to move after the old family horse at the rate of five miles in the same time, while even this speed is only to be obtained, perhaps, by incessant urging. We think it would be an idle dream, if any one supposed that this taste for rapid driving is likely to die out. We rather believe it will increase, until such improvements shall be made in the breeds of horses that a speed shall be hereafter obtained, which at the present day would seem to us almost fabulous. Granting that horses of great speed have become one of the imperative wants of society, no efforts of the

few will have any effect against the will of the many, if that effort is exerted in opposition to the popular necessity. It would seem better that we should candidly examine both the advantages and dangers of connecting a trotting course with the farmers' arrangements for the autumnal agricultural festivals, so that while we guard against evil results on the one hand, we may enable the farmer to secure the benefits to which, as the original breeder of the horse, he is justly entitled. The farmer who raises a promising colt is rarely a profound judge of his best points, or of the beneficial effects of proper training to secure the full advantages of his good properties. The colt is for sale, and without adequate trial, his owner feels himself highly rewarded, if he secures from his trainer seventy-five or one hundred dollars as his market value, and it is not seldom that he is made deeply to regret that he had not tested the speed of his colt, previously to throwing him into the market, when he learns that a few weeks of careful training, have, in some instances, even quadrupled his market value. A proper opportunity, then, of testing the speed of a colt would often secure to the farmer the advantages of an increased price, and at the same time lessen the importance of that any thing but respectable class in society, the fraternity of horse jockeys. This is by no means a light consideration, when, from every side we hear the complaint that farming is a losing business.

It has been objected by many that the farmer has no necessity for a very fast horse; but, under proper training, a fast horse may be easily made to work well upon the farm in all departments where such animal is needed, the error arising from the disposition to connect great speed with vicious propensities. In this view of the subject, the addition of an exhibition of trotting horses to our cattle shows—under proper restrictions—is valuable and important. It is by no means unlikely that such exhibitions as those now under consideration, may tend to take the management of horse shows from the hands of the low and vicious, and to transfer it to men of higher character, if it should not happen on the contrary that the kind of excitement usually attending such occasions, may tend to lower the taste of the committees in charge of them and by degrees draw the farmer down to the jockey level. Your committee, however, believe that in all its bearings upon the pecuniary interest of the farming community far more good will result from properly directed horse shows in connection with other farm products, than evils to the farmer himself. This being conceded, we proceed to consider the moral bearings of the subject. There is probably nothing which will draw together a larger collection of unprincipled men and boys, than the public announcement of a "horse race," to be witnessed by all

persons, without the inconvenience of any great obstacle in the form of an admission fee; and although many such persons are to be found at every cattle show, there is usually wanting any object to concentrate all their energies and pernicious influence. This object is, however, at once supplied by the addition of that somewhat novel feature, the trial of speed of such horses as may be offered to compete for premiums.

It is undeniable that much betting and drinking are to be witnessed upon all occasions like those under consideration, which have no object sufficiently exciting to call them forth, except the horse race. It is true, the sums which are staked upon the speed of favorite horses are for the most part small, and it has been argued that the loss or gain of five or ten dollars in a bet is too trifling to be even regarded as betting in a vicious sense. This might be true if the parties to the bet were men of wealth, to whom the loss or gain of a hundred dollars would hardly afford a momentary excitement. It should be borne in mind, however, that the persons drawn into these practices are chiefly young men of small means, depending upon their daily labor for their support, and to whom the loss of no more than five dollars, is a serious drawback in point of comfort. But the pinching in ways and means, resulting from such losses, is a mere trifle, in comparison with the moral injury which must certainly follow successful betting. The young farmer or mechanic, accustomed to procure money only by the sweat of his brow, naturally experiences a feeling of exultation, as he receives his first winnings, that an easier method of procuring money, than by hard but honest toil, has presented itself to him, and he must be of far different mould from the mercantile speculator or successful forger, if his first success does not tempt him to another and probably more extensive trial of the same chance. It becomes his first lesson, perhaps, in thriftless, idle habits, and it is a matter of great responsibility, when the temptation to commence such habits is offered by men and associations which hold a high and honorable position in the estimation of the world. It is frequently doubted by those who hold the management of such exhibitions, if these things are so. From the judges' stand, of course, it is not to be supposed that they should be visible, but we think few observant men can be found who have occupied a position among the mass of "outsiders," who have not been pained by many such facts, while oaths and vulgarity are poured into the ears of females and children, the latter of whom are apt pupils in all such teaching. The question comes up then, and demands serious consideration, Can any regulations be adopted for securing the benefits and avoiding the evils which have been alluded to? As a mere trial of speed, it would be

sufficient that the horses should be trotted singly, the comparative speed to be determined by the stop watch. Such a course would give rise to less excitement and to less advantageous opportunity for betting, and would certainly secure to the exhibitor all the advantages which he could reasonably ask for. The time allotted to this part of the exhibition ought also to be carefully limited, and the trial promptly closed when all horses regularly entered have trotted in their turn; nor should the trotting course be used in connection with the object of testing comparative speed, except under the direction of a committee appointed by the society to distribute its premiums.

These suggestions are offered rather to elicit discussion, than because we suppose much attention will be paid to them. Other restrictions may be devised, having the same tendency to check the evils which seem to threaten us in connection with this subject, and the adoption or non-adoption of them, will, in a great degree, depend upon the feeling which underlies the efforts to attach trotting courses to the fixtures of our agricultural societies. If this feeling is the honest, straightforward one of benefiting the farmer, no man interested in the matter will hesitate to take all precautions to check every evil which may flow from horse trotting; but if, as it is somewhat to be feared, the feeling is a simple spirit of a jockey, although an unconscious one, let this Board and the societies patronized by the State, do all that in them lies to correct the sentiment and reform the evil.

John C. Bartlett.
W. G. Lewis.
John Brooks.

In the discussion which arose upon this report, it was unanimously conceded to be for the interest of the farmer to breed horses, as it had now become one of the most profitable branches of farming. It was equally admitted to be for his interest to show them, and that to show them to advantage, that is, to show their action and carriage, a suitable place was requisite, and that the most suitable place was the well laid tracks connected with the grounds of many of our agricultural societies.

At the same time, it was generally admitted, that evils might be connected with the exhibitions of horses and trials of speed, in the shape of betting, which, perhaps, could equally attach to the ploughing match, and in fact, to every comparative trial of skill and ability in any department of active life, the evils

which connect themselves with trials of speed being only analogous in principle to those attending games of chance, "grab-bags," lotteries, post offices, &c., countenanced and introduced at the "fairs" held at some time or other in nearly every town in the country.

It was thought, also, that the chief object of a track, and of the trials of speed at agricultural shows, should be to aid and encourage the farmer to raise and dispose of his horses to the best advantage, and that this encouragement would not be extended by offering premiums for speed merely; that the main object would be accomplished equally well by allowing horses entered to run against time only, against which there could be no reasonable objection, while a limited speed for young and untrained horses would enable committees and the public to judge of the action and points of such animals equally well with a high speed, since it is well known that the speed of a young horse, by careful training, may be increased, on an average, nearly one-fourth, and that horses capable of being trained to high speed, may, with equal facility, be trained to slow work on the farm.

These and various other considerations, led to the unanimous adoption of the following Resolutions as embodying the sentiment of the Board with regard to the matter, viz.:—

Resolved, That the Board of Agriculture recommend to the various agricultural societies to take such measures in reference to the exhibition of horses at their cattle shows, as shall divest them of all characteristics of the horse race, and as far as possible, of all immoral tendencies.

Resolved, That in the opinion of this Board, the offering of premiums for equestrian exhibitions, is a perversion of the funds of the State—such exhibitions being in no sense to be regarded as agricultural products.

Resolved, That we recommend to the several agricultural societies not to use their trotting courses for fast horses during the cattle shows, except when ordered by the committee on horses.

Resolved, That it is not for the interest of the farmer, or the breeder of horses, at the various county cattle shows, to countenance or allow, in any trial of horses, a faster rate than a mile in four minutes, the trial to be made singly, or in pairs harnessed together; and any horse driven at a faster rate should, in the opinion of this Board, be ruled out in all premiums.

There was also a general expression of confidence in the good judgment, discretion and high character of the officers of agricultural societies, in whose hands it was thought safe to let the whole matter rest, and who, it was presumed, were fully competent to put all necessary restrictions upon this part of their exhibitions.

The superintending committee of the State Farm for the coming year was constituted by appointing Messrs. Wilder, French, Tower, Newell, Brooks, Bartlett, Chandler and Lewis.

It was voted, That the committee on crops procure cuttings of the osier willow, sufficient for a small plantation, by way of experiment, with reference to furnishing materials for the future employment of boys.

The practicability and economy of purchasing additional land for the State Farm, was strongly urged by the various committees having charge of the farm. The importance of supplying the inmates of the State Reform School with milk, was apparent to every one. The number of cows which the farm could now keep, in addition to the other stock which was indispensable for carrying it on, did not exceed twenty or twenty-five, whereas it was for the advantage of the State to keep at least fifty or seventy-five. The greatest quantity of milk which could be furnished now, at any one time, even in the height of the flow, did not exceed fifty gallons a day, which was wholly inadequate to meet the wants of six hundred and fifty individuals in the most economical manner. It was, therefore, voted to give the committee already appointed for the purpose of applying to the legislature for the usual appropriation for the farm, discretionary power to apply also for an appropriation sufficient to purchase certain adjoining lands, after suitable bonds should have been procured for their sale.

The subjects alluded to above, and discussions upon many other matters, chiefly preliminary in their character, the results of which will be reported hereafter, have occupied the attention of the Board during the past year.

One of the most encouraging signs of the times is the earnest and wide spread desire of becoming thoroughly acquainted with the principles and improved practices of agriculture, which now seems to pervade not only our farming population, but

many other classes of society also. It may with truth be said, that there was never more enthusiasm in this department of practical science, than at the present moment. Old prejudices are fast passing away before a thoughtful and candid consideration of the suggestions of skilful observers and careful reasoners. Farmers' clubs are becoming more and more common in the small towns throughout the State. Lectures upon the sciences connected with agriculture give opportunities of obtaining useful information, and large audiences listen attentively to the principles unfolded to them. The volumes distributed by the State were never so extensively called for as at the present time, the edition usually published hitherto not being adequate to supply half the demand. Our farmers are not now, as they once were, too much afraid of falling into error, to be willing to seek for truth wherever it may be found, nor of ascertaining by careful experiment the best modes of treating their lands or their crops.

As might be expected, the interest in the county agricultural societies has increased, and their exhibitions were never better attended, or more successful, than during the past year. Large numbers of new members have been added, and the aggregate amount of receipts both from their contributions and from other sources, has been much greater than in any former year. The officers of the societies in every part of the State, without doubt, perform their duties faithfully, and a laudable spirit of pride and competition prevails in the different sections of the Commonwealth, while the greater system and harmony of action, resulting from the organization of the Department of Agriculture, in which every society has a direct representation, renders all more efficient and serviceable in developing the resources of the State. The financial condition of the societies, together with many of the details of their operations in the distribution of premiums, during the past year, will be found in the Appendix, to which reference is respectfully made.

Massachusetts, with an area of only 7,250 square miles, has a productive industry creating a value of more than three hundred and fifty millions of dollars a year, or nearly a million a day. In this unexampled prosperity agriculture takes the lead, the annual value of its productions exceeding that of any other branch by over eleven millions of dollars. Every thing which

aids in developing its vast resources adds not only to the grandeur of the State but to the happiness and prosperity of the individual citizen.

It should not be forgotten that this prosperity is, in a great measure, the effect of the enlightened policy of our State government in past years, in encouraging agriculture and the mechanic arts. In consequence of this judicious course of action, and the character of our people, we have now the respect and confidence of all who know us, giving us a financial credit abroad unrivalled by that of any other State, and indicating a growth and prosperity in the future, limited only by the energy, intelligence and integrity of our people.

CHARLES L. FLINT,
Secretary of the Board of Agriculture.

Boston, January 28th, 1857.

REPORTS OF COMMITTEES

APPOINTED TO VISIT THE

AGRICULTURAL EXHIBITIONS.

ESSEX.

Agreeably to appointment, as delegate from the State Board of Agriculture to the Essex County Agricultural Society, I attended to the duty assigned me, and submit the following report.

The annual exhibition was held this year, at the city of Newburyport, on the first and second days of October. The weather was delightful, and an immense concourse of people—estimated at twenty-five thousand or more—attended; such a crowd as this quiet city rarely witnesses, notwithstanding which, good order prevailed, and not a sign of disturbance appeared.

The first day was occupied by the several committees in examining the various articles and awarding the premiums, leaving the second day for jubilee, and happy reunion of the members of the society, entertaining invited guests, strangers, &c.

The large number of manufactured articles, the fruits, vegetables and flowers, &c., were tastefully arranged in the city hall, while cattle, horses, swine and fowls enjoyed a vacant lot at a little distance.

In another part of the city about a mile and a half distant, the ploughing match was held, where twenty double, and eleven single teams of horses and oxen valiantly contested the noble art, and the way the Michigan, side hill, double swivel, deep tiller, subsoil and other ploughs, went through the land, was a perfect wonder to the uninitiated citizens.

It seemed this was the great attraction of the day, and interested thousands of persons, among whom many distinguished individuals might be seen, of whom the Hon. George Peabody, late from London, attracted much attention; truly, where such are interested in the ploughing match, the occupation must be worthy and noble.

The handsome amount of one hundred and twenty dollars

was distributed in premiums among the most successful competitors, the work being generally well done. The teams, with one or two exceptions, were handled by men who seemed to appreciate their value.

The premiums for cattle, horses, &c., were well arranged; a beautiful stallion received twenty dollars first premium; also, the best twenty sheep, the same sum. Other animals were liberally provided for, as over five hundred dollars were distributed among sixty-four specimens.

Butter, cheese and bread were on the tables, excellent specimens of each, and it is worthy of remark that three loaves of nice bread were marked as made by children of six and eight years of age; the reflection arose that the children were being "brought up" right.

Of fruit, there were one thousand and eighty-five dishes, well arranged, and many tempting specimens, particularly pears, peaches, &c.

The tables were literally covered with flowers, vegetables, specimens of needle-work, drawings and paintings, very much to the credit of the wives and daughters of the citizens of the county.

After the ploughing match, a procession was formed and proceeded to the Pleasant Street Church, where an agricultural address was delivered by one of our members, B. P. Poore, Esq., who, in a pleasant, thorough manner entertained the audience with a rehearsal of the days when

> "Our ancesters lived on bread and broth,
> And wooed their healthy wives in homespun cloth;"

presenting some statistics in relation to farming in this county in the olden times, contrasting favorably with the products of our modern agriculturists. It is well in these go-ahead days to stop, reflect and compare notes sometimes on the past.

From this, the audience and many others, proceeded to the dinner tent, where a perfect jam took place; the ladies comprised about one-third of the company of some fourteen hundred individuals. All obtained seats, and partook of an excellent dinner.

The distribution of premiums was made among a large number. Four hundred and nine prizes and gratuities were awarded in sums from twenty to fifty dollars.

The receipts of the society were large, as the sum of thirteen hundred dollars was received as admittance at the city hall alone.

Probably no society in the State is more prosperous than the Essex. It has, the past year, been given a handsome farm, located at Topsfield, through the beneficence of the late Dr. Treadwell, of Salem, to be received by them on certain conditions, the object of which shall tend to promote the agricultural interest.

The affairs of this society are managed in an admirable manner, and great interest felt by its members; probably owing in part to the fact of its large number of members, and liberal amount of money awarded in premiums, and having a populous rural district, as well as several thrifty towns and cities.

The land is not of the best quality generally, but cultivated with much judgment.

All of which is respectfully submitted.

Wm. G. Lewis.

MIDDLESEX.

The 30th of September opened very inauspiciously for cattle shows and other out-of-doors pleasures. But the only effect, if any, upon the exhibition of the Middlesex Society, at Concord, was a diminution of the number of visitors, a defect probably felt far more sensibly in the funds of the society, than in the comfort of those who attended the show.

No lack of spirit or energy was any where apparent, and the whole arrangements reflected great credit upon the managing committee. Every thing was attended to with great punctuality, notwithstanding a very uncomfortable rain.

The performances of the day commenced with the ploughing match, which was well contested, and furnished some admirable specimens of work.

If any of the spectators had upon their minds objections to

the Michigan plough, I think the work done by it must have removed them.

The peculiar spiral form in which the sod is left, and the generous quantity of subsoil thrown upon it, gives to the field the appearance and character of spaded ground, and saves a vast amount of labor in the cultivation of the crop. One feature I noticed, which is common to all county exhibitions of ploughing, the undue urging of the team by whip and voice ; and this can never be removed while the time of ploughing is a condition upon which the award of the premium is to be made. Something of this is undoubtedly owing to the "*esprit du corps*" which is felt when different towns contend against each other, and it is to this feeling that I attribute the fact that far less urging of the team is generally to be seen at town exhibitions, where neighbors only enter into the contest, than in those which are managed by county associations, where each competitor feels that the honor of his town rests upon him. The truth is, we do not want quick ploughing at the expense of the cattle, but the real object of the ploughing match is to determine who is the best workman at home.

The next portion of the exhibition was in the society's hall. The multifarious departments here were elegantly filled. Luscious fruits, mammoth vegetables, tempting bread, and beautiful butter, elaborately wrought specimens of work in the ladies' department, machines and farming implements, abounded on all sides in too great quantity to give any other than a general impression of elegance in all departments, while the limited opportunity for examination of course prevented any particular criticism of single articles.

Next followed the spading match, which was well carried out, and afforded a display of good work. The next step in the programme was an address upon "Agricultural Head-work," very suggestive.

The exhibition of stock was limited, but good. Some very fine blood stock were in the pens, but my impression at the time was that a cow entered as "native" possessed far better indications, both for milk and flesh, than any of the imported stock

The show of working oxen was very good, and some very fine specimens of training were exhibited.

The closing portion of the exhibition, the dinner, found every

one well prepared to give it quite as minute an examination as was awarded to any portion of the show, and I believe the committee of the whole gave it their unanimous approbation.

JOHN C. BARTLETT.

MIDDLESEX NORTH.

The second annual exhibition of the Middlesex North Agricultural Society, was held at Lowell, on the 16th of September. Thanks to the worthy president of the society, William Spencer, Esq., I was enabled to visit every portion of the exhibition, and found that—with methodical arrangement, and a prompt observance of the programme—there was no difficulty in transacting all the business in one day. While it might be highly advantageous for agricultural societies to hold frequent meetings during the winter season, for practical discussions, it is questionable whether protracted cattle shows are advantageous. To the working farmer, "time is money."

The cattle show was on the north common, and it was gratifying to find that there were more cattle than the long array of pens would contain, showing an increased interest in this important department of agriculture. The display of milch cows was excellent, embracing fine specimens of the Native, Grade, Durham, Ayrshire, Devon, Galloway and Jersey breeds. There was a noble Durham and other good bulls; and if it be true that "the ox knoweth his master," two fine yokes of cattle had no reason to be ashamed of the care of their acquaintances. A small show of horses was very creditable, although there were no "trials of speed" for the gratification of 2.40 lovers, but instead, some good honest pulling and backing, well calculated to display the noble qualities of the fine animals entered. The hogs were not up to my expectations, although they were said to surpass those exhibited last year. I saw no sheep, but there was an abundance of poultry. It was the season of "conventions," and there they were, on various "platforms," gobbling and cackling, quacking and crowing, hissing and cooing, as if

determined to give their ideas on the "goose question,"—to discuss the fate of "Turkey,"—to enter protests against the *picking* of the public purse,—and to take into serious consideration the condition of their own *crops*.

At Huntington hall there was a display of fruit, flowers, vegetables, domestic products, fancy articles and manufactures, which was well worth the inspection of the throngs who visited it, about six thousand contributing "material aid" to the amount of a dime each for the privilege. I doubt whether there has been a superior exhibition of fruit by any society this year, and congratulate the fruit-growers of Middlesex North on the success which has attended their labors. The vegetables and the flowers were by no means remarkable, but there was a good show of bread and butter, and some first-rate knives to cut and spread it with, from a cutlery establishment in Pepperell. Several of the great establishments of the "City of Spindles" contributed displays of their manufactures, and there was no lack of the delicate handiwork of female ingenuity, or of the substantial products of the workshop, or of works of art, or of many other articles, the names or destined use of which it was difficult to determine.

The address, by the Rev. E. B. Foster, proved the correctness of the lamented Henry Colman's views upon agriculture and the clergy. "If," said he, "instead of preaching theological mysteries, which narrow the mind, and too often curdle all the milk of kindness which a man has in his heart, they would occasionally give them a discourse on natural science and good husbandry, and show them the Divine Providence as it operates every where around them, they would be more likely to make good men and good Christians."

A bountiful dinner was served at an early hour, and followed by brief addresses from W. Spencer; Sheriff Keyes, of Concord; A. W. Dodge, of Hamilton; Editor Varney, Tappan Wentworth, of Lowell; Otis Adams, of Chelmsford; B. F. Cutter, of Pelham; Secretary Flint, of the Board of Agriculture, and other gentlemen, called up in turn by the witty toast-master, W. B. B. Wightman, of North Chelmsford.

The reading of reports made by committees, and the election of officers, closed this interesting exhibition. Every thing which

came under my observation bore testimony to the vigorous and flourishing condition of this young society, which has a brilliant prospect of usefulness before it.

BEN: PERLEY POORE.

WORCESTER.

Having been delegated, by the Board of Agriculture, to attend the annual cattle show and fair of the Worcester Agricultural Society, held in the city of Worcester, on the 24th, 25th, and 26th of September, in connection with a show of stock by the State Society, I proceeded to fulfil the duty assigned me, on the second day of the fair, having been prevented from an earlier visit. I am under the necessity, therefore, of relying upon the statements of others for an account of the show on the first and part of the second day. For two days previous to the 24th a violent rain storm prevailed; yet, notwithstanding this, the show was larger than on any previous year. The weather was very fine during the fair.

The entries of stock were quite large, numbering of cattle in the pens 208, besides forty yoke of working oxen and steers.

The herd of Jersey stock, owned by the State Society, consisted of three imported cows and their progeny, which consisted of two cows, three heifers, one heifer calf, and two bull calves, which were all sold the second day. The prices obtained for them may be, in part, a criterion by which to judge of their value. The price of the cows ranged from $50 to $240; heifers, from $55 to $175; heifer calf, 6½ months old, $45; and the bull calves each, $15. In connection with the State Fair, there were several entries of dairy cows and bulls.

Samuel Ellsworth, of Barre, exhibited a fine lot of six dairy cows; there were also excellent lots of six, by Asa G. Shelden, of Wilmington, and William Robinson, of Barre, and some equally fine lots of four, by Amos S. Knight and William Robinson. W. W. Watson, William Eames, and Rufus Carter exhibited one each, that attracted considerable attention. Paoli Lathrop, of South Hadley, exhibited his famous Durham bull;

Harvey Dodge, a fine Devon; John Brooks, Jr., a Devon and an Ayrshire; Peter Harwood, a Devon; William Lincoln, two Ayrshires; William Spencer, an Alderney; and Moses Thompson, a native. Several others exhibited bulls of fine appearance, all of which indicated an increasing desire to improve the breeds of cattle for the dairy, as well as for work and beef.

There were five entries of Durhams and nine of Ayrshires, for premiums.

In the Worcester show, there was a large number of fine bulls exhibited; some of them, patriarchs in service, while others had seen but few months of life; and it would be superfluous to attempt an enumeration of the many excellent cows, heifers, calves, working oxen, steers and fat cattle on exhibition, all of them prizes to their owners, which must have caused the various committees no little anxiety to judiciously award the premiums.

There were eight pens of sheep of various breeds, and twelve entries of swine, that had evidently "lived like pigs in clover." The Suffolk, and a cross between that breed and the Mackay, predominated.

Of the poultry there were forty-eight entries; the number must have been sufficient to satisfy any "fowl-fancier," but as to *quality*, not so much could be said, it being evident that many specimens had nothing whereof to boast but their legs and a capability of using up considerable surplus of food without any apparent effect.

The butter and cheese on exhibition were of excellent quality, judging from appearances, but in quantity far below what might have been expected in a region so celebrated for excellent dairies. A similar opinion was formed respecting the exhibition of agricultural implements and mechanic arts, Worcester being the "City of Mechanics."

The largest number of the former were contributed by Nourse, Mason & Co., and J. P. Adriance & Co. Of the mechanic arts, the contributors were "few and far between." There was considerable competition in reaping and mowing machines, of which there were seventeen entries, five or six of which were for premiums. The committee in behalf of the State Society awarded the premium offered to D. C. Henderson, of Sandusky, Ohio, and "A gratuity to J. P. Adriance & Co., for

Manny's machine, which possesses decided advantages over any other on exhibition."

The horticultural exhibition was all that could be expected; a scene where one could look with delight and satisfaction, interspersed occasionally with, perhaps, a longing desire to test the qualities. True, the number and varieties of peaches were deficient, but their places were well supplied with pears, of which there was a fine show, both in number and variety.

The ploughing match took place early on the first day of the show, which may in part account for so few being present to witness the trial. The ground was unfavorable, being heavy from the recent rains, yet the work was remarkably well executed by the fourteen competitors.

On the evening of the second day, Hon. Levi Lincoln gave a levee at his mansion, to the trustees of the State Society and some invited guests. It was a pleasant social gathering, and characteristic of the generous hospitality of the honored governor, who, for thirty years, was president of the Worcester Agricultural Society. Here was a pleasing contrast of the past and the present, strengthening those links that bind succeeding generations to those gone by.

The exhibition of horses was the principal feature of the show on the third day, and was evidently very attractive, judging from the great numbers present.

It is a question, however, whether horse-races properly belong to an agricultural fair. A horse show should form a part of all such exhibitions, and the noble animals be put to sufficient motion to judge of their qualities as roadsters, or for carriage horses, as well as soundness in "wind and limb;" but to make the whole show culminate in a horse-race or series of races, is attended with evils which it is feared may be, sooner or later, felt by our agricultural societies. A large number are attracted to shows, solely to witness this spectacle, who neither know nor care aught for improvements in cattle, farming implements, or the products of the farm. For a time, these races may help to increase the funds of a society by the increased number of persons who will pay the fee for the purpose of enjoying the excitement; at the same time there is danger that the interest in other and more legitimate objects of these fairs, will decrease.

The tendency of this was somewhat noticeable at Worcester, as the "beginning of the end."

The fair continued three days, but no time was found for a public address, nor at the dinner any time for "table talk." As soon as the dinner was ended,—which, by the way, was a sumptuous repast, worthy the substantial farmers of the Worcester Society,—the reading of the reports was commenced; but the trotting had also begun, the seeing of which had so much greater attraction than the hearing of reports, that in a short time the hall *echoed* to the voice as the reports were read, with but few listeners, and these few were mostly looking out, while their ears were within, thereby evidently trying to "serve two masters." Governor Lincoln with much truth remarked, "These horses have run away with us all."

The president of the society, John Brooks, of Princeton, labored perseveringly, and with good success, to make the show pleasurable and profitable, and he can well feel the satisfaction of having had the largest and best show ever held by this society.

Francis DeWitt.

WORCESTER SOUTH.

The undersigned, by the direction of the State Board of Agriculture, attended the annual cattle show and fair of the Worcester South Agricultural Society, held at Sturbridge, on the first and second days of October.

The weather was favorable, and every thing in nature seemed to combine to render the occasion one of pleasure and usefulness. The cattle pens were conveniently located on a pleasant green in the centre of the village. The show of stock was for the most part good. The cattle had evidently been selected with much care and good judgment. Daniel Dwight, Jr., of Dudley, exhibited a bull fifteen months old, which was a superior animal of his age; his weight was nine hundred and sixty-

eight pounds. It is one-half Durham, the other half Devon. Two bulls were exhibited by Eli K. Lincoln, of Warren, four years of age; one was a full blood of the Devon stock, the other one, half Devon, and I think, half native. The half blood Devon was the heaviest; they are both fine animals, and without doubt, will do much for the improvement of stock, wheresoever located.

There were but few entries of cattle for the stall; two or three pairs were of fair quality. The show of working oxen was large and very fine. I have never seen it excelled. The cattle were beautifully matched, well trained, and had evidently been reared and selected with good care and taste.

The ploughing match took place about three-fourths of a mile east of the village; the ground was hard and quite stony, and the turf considerably worm eaten, which rendered the ploughing difficult. There were five teams that entered for competition. The ploughmen performed the work well, considering the difficult nature and condition of the piece of land selected for the trial. In the afternoon was a trial of drawing and backing with a cart and load, which, together, weighed forty hundred.

The exhibition in the hall consisted of various kinds of domestic manufactures, together with rich and beautiful specimens of butter, cheese and bread, all of which indicated that the ladies of southern Worcester were ladies in deed, as well as in name.

The hall presented a good show of fruit for the season. Mr. Bond, of North Brookfield, presented sixty-four varieties of apples and sixty-nine of pears. Messrs. Hammant and Belknap, of Sturbridge, presented some fine specimens of apples.

The second day, the horses were exhibited; owing to indisposition your delegate was unable to witness this exhibition. At 12 o'clock, was the address in the church by the Rev. Mr. Parker, of Southbridge, upon the connection between the pursuit of agriculture and the moral condition of a nation. After the exercises in the church, the audience repaired to the hall, where were spread tables loaded with rich and inviting food. After the wants of the inner man had been supplied, then came the reading of reports from the several committees, together with brief and pertinent addresses from the worthy president of

the society, and others. In conclusion, the undersigned would remark, that all the arrangements for the exhibition were in good taste and admirably carried out. The officers of the society were prompt and energetic in the discharge of their duties, and particularly the chief marshal of the exhibition, Otis Farnum, Esq., to whose gentlemanly deportment, no less than his ceaseless activity in his particular sphere of duty, much of the quiet and order of the exhibition is to be attributed.

Geo. W. Hubbard.

HAMPSHIRE, FRANKLIN AND HAMPDEN.

Agreeably to the appointment by the Board, the undersigned attended the thirty-eighth annual exhibition of the Hampshire, Franklin and Hampden Agricultural Society, at Northampton, on the seventh and eighth days of October, two delightful days.

The exhibition of stock took place on the first day, upon the society's ground, a beautiful, level plot, about three-fourths of a mile from the centre of the village, inclosed by a substantial wooden fence, within which, and around the margin of the plot, is an evenly graded course for the exhibition of horses. The plot contains sixteen acres, and was recently purchased by the society at a cost of $4,000, and when properly fitted up with suitable buildings, will be a most valuable acquisition.

The pens were arranged near the centre of the inclosure, and though not as numerous as might have been expected, they were well filled with cattle, sheep and swine, which, in quality, have seldom been surpassed at any exhibition in the State.

The cattle were strongly marked with foreign blood. The Durham stock owned by the president of the society, Paoli Lathrop, is highly creditable to that gentleman and to the society. It consisted of six cows, one three years old heifer, two yearling heifers, a bull six years old, weighing 2,000 pounds, a magnificent animal, and two calves—a bull and a heifer—six months old, weighing 700 pounds each ; all thorough bred, of large size and excellent proportions. Elbridge Pease,

of Middlefield, exhibited a thorough bred Durham bull, two years old, sired by Mr. Lathrop's, weighing 1,600 pounds, and by no means inferior to his sire. A three years old bull and two two years old heifers of fine appearance, were noticed, belonging to Jonathan Clark, of Granby. Isaac Clapp, of Easthampton, had a good Hereford grade bull twenty months old. Another fine Hereford bull, two years old, of the same grade was exhibited by Ahira Lyman, of Northampton. The Herefords were all fine animals, but suffered in comparison with the Durham stock of the same grade. T. P. Huntington, of Northampton, had a pure Devon bull, a very beautiful animal, but too small. The Jersey blood was not extensively represented. One cow of pure blood, was noticed, which had the appearance of a great milker.

The fat cattle were of very superior quality. Among the large number offered, were three pairs of oxen owned by Seth Bush, of Westfield, weighing respectively, 5,900, 4,400 and 4,100 pounds. Five pairs of oxen, owned by Charles Fowler, of Westfield, weighed respectively, 5,600, 5,000, 4,800, 4,600 4,500 pounds. One pair of oxen, owned by Maj. Taylor, of Westfield, weighed 4,500 pounds. There were other noble specimens of fat cattle on the ground, amounting, with those above mentioned, to thirty.

The number of working oxen was not large, but they were of great size and well matched. One pair of four years old Durham twins, weighing 3,740 pounds, were noticed, owned by Cephas May, of Conway. The frames of these cattle were truly gigantic; as to flesh, only in fair working condition. Mr. May had a pair of twin heifers of the same blood.

There were some good specimens of swine, but none very extra were noticed; they were no better than they should be in the grain growing region of the society.

The sheep were few but good; mostly of the South Down breed.

The ploughing match and trial of strength and skill of working oxen were omitted; these operations being deemed of small moment where nearly all the ploughing is so easily and well performed, and almost all the team work is done by horses.

The exhibition of horses came off on the second day, with great credit to the officers and others immediately interested,

for their perfect arrangement and skill to prevent accident, and satisfy the desire to see, of so large a company of spectators. It is worthy of remark, that every operation was conducted in an eminently business like manner, and to the satisfaction of all concerned.

The exhibition of draft horses was satisfactory. The load for trial was 6,000 pounds, to be moved by a pair of horses on a surface which, though nearly level, was quite impressible. Some fine horses were presented for trial of speed, and in carriages, which performed well, and completed the course, a distance of half a mile, in one and a half minutes; but none were displayed under the saddle.

The exhibition of horticultural productions, manufactures and fancy articles was at the town hall, and continued through the two days and evenings of the fair. The specimens of fruits were not very numerous, but generally of the choicest varieties, and of excellent quality. One lady, however, Mrs. W. A. Arnold, contributed thirty-one varieties of apples, and there were upon the tables one hundred and eight plates of pears. The grapes, mostly of the Isabella variety, were very fine.

There was a box of prunes, raised in Northampton, by L. Tribus, which would not suffer in comparison with the imported article. Mr. T. contributed some fine heads of cauliflower, Kohl Rabi, Endive and other choice vegetables.

The exhibition of garden vegetables, though not extensive, was quite respectable, and the numerous specimens of bread, butter, cheese and honey, were of very inviting tendency.

There was a great variety of manufactured articles of superior workmanship, as carriages, harnesses, agricultural implements, cabinet furniture, hardware, leather, cloth of various kinds, &c. Elegant specimens of bookbinding were noticed, from the establishment of the Springfield Republican, and also from that of Mr. James Marsh, of Northampton.

Of fancy articles, there were enough in the hall to show the fine taste of the ladies, and enough to blend the useful with the ornamental, and to prove their superior skill and industry. Some specimens of patch-work, by a lady of seventy years, were noticed, which few of any age could surpass. The walls of the hall were hung throughout with carpets, rugs, bedspreads, articles of ladies' and gentlemens' clothing, framed

paintings and pictures; and the tables were ornamented by a profusion of flowers, both natural and artificial.

The annual address, which was expected from Hon. Alexander H. Bullock, of Worcester, failed, on account of that gentleman's indisposition.

At the close of the exhibition of horses, on the society's grounds, the officers, invited guests, and such as chose to join in the procession, proceeded in carriages, attended by a band of music, to the town hall, and thence on foot to the Mansion house, where they partook of an excellent dinner, provided for some two hundred and fifty persons, too small a proportion of whom were ladies. After dinner the reports of committees were read, and brief speeches and sentiments were given by several gentlemen. The proceedings throughout were of the most satisfactory character.

The officers of the society manifested due respect for the Board of Agriculture by the very kind and respectful manner in which they received your delegate.

O. C. Felton.

HAMPSHIRE.

The annual exhibition of the Hampshire Agricultural Society, was held at Amherst on the 9th and 10th days of October. The place is admirably adapted for such purposes. The surrounding scenery is surpassingly beautiful. All the glories of autumn, the ripened harvests, and the thousand hues of the foliage, were in perfection. The sky was serene, and the air deliciously balmy. On both days, the whole population of the county, men, women and children, seemed to be present, and to enter with a thankful and decorous joy into the spirit of the occasion. Every thing indicated a rèal harvest-home festival. I was gratified to observe that the officers of the college mingled in the festival, not as mere lookers on, but with as much apparent zest and interest as the farmers themselves. I witnessed every part of the exhibition. Good nature and perfectly good order prevailed throughout, without a single exception. I saw no

act, and heard no word which would not have been becoming any where, and at any time.

The show of cattle, sheep, swine, poultry, &c., was of good quality, but not very extensive. There were some fine blood animals. About one hundred horses and colts were on the ground the second day, many good, and some of great merit. Only one town team was present, and that from Leverett, which both from the number and quality of the oxen, was highly creditable to the farmers of that town. It is to be hoped that that peculiar and attractive feature of exhibitions in the western counties will not hereafter be omitted.

The drawing match was well contested by many excellently trained teams.

A large number of competitors entered the lists at the ploughing match. The ground was a tough sward, and well calculated to try the strength of the animals, and the skill of the ploughman. Perfect order prevailed. The men and the teams seemed perfectly to understand each other, and to be on excellent terms. Nobly and beautifully was the field contested. I have rarely witnessed a more interesting spectacle of that kind. I think I have never seen a better average performance, some of the work being very excellent, and every competitor doing his work well. Very few ladies were present. Ploughmen appreciate their smiles, and if the ladies of Hampshire would make the experiment, as they have done elsewhere, they would find the ploughing match one of the most interesting and exciting portions of the exhibition, which woman has contributed so much to make useful, attractive and ennobling.

The hall was well filled with worthy specimens of the products of the farm, the garden, the orchard, the dairy, the workshop, and of the handiwork of matrons and maidens. The samples of vegetables, butter and cheese, were numerous and excellent. The samples of brown, wheat and rye bread, were more numerous than I have ever seen elsewhere. The quality, tried by all practicable tests, was excellent. The rye bread, especially, in beauty of appearance and deliciousness to the taste, exceeded any which it has fallen to my lot to see or taste elsewhere. If the fair bread makers of Hampshire could be induced to colonize the wheat raising States of the West and South, they would accomplish a much needed revolution, and

entitle themselves to the gratitude of the dwellers in that region, and all travellers of this and all coming generations.

Professor Nash had been engaged to deliver the address, but was providentially absent. The venerable and learned Dr. Hitchcock, upon brief notice, kindly consented to supply his place. From his abundant treasury he gave us things both new and old, abounding in wit and wisdom, all interesting and instructive, and listened to with great satisfaction by an intelligent and appreciating audience. The choir was composed of students of the college, two of whom contributed appropriate and beautiful hymns for the occasion. The dinner was bountiful and good. The hall was entirely filled, the guests numbering more than three hundred, of whom many were ladies. Speeches were made by several gentlemen, and the men and women, the young men and maidens of Hampshire, evinced their interest by remaining in unbroken numbers until the shades of evening were about us and the scene closed.

All the arrangements appeared to me judicious, and admirably carried out. The society appears to be in earnest, and prosperous. My previous opinion that our agricultural exhibitions are the real festivals of the people of Massachusetts, and that they are the instruments of very great good, was, by this experience, strengthened and confirmed.

I am indebted to the Hampshire Society, and to the people whom I met, for two very happy days, and many pleasant memories.

J. H. W. Page.

FRANKLIN.

As the representative of the State Board of Agriculture, at the annual exhibition of the Franklin County Agricultural Society, the undersigned submits the following report of what fell under his observation in connection with that festival.

The exhibition occupied two days, October 1st and 2d. Owing to a misapprehension in regard to the running of the trains from Boston to Greenfield, your delegate did not arrive until near

the close of the first day. He failed, by this delay, to witness the show of cattle, the ploughing-match, and many other things which it would have been pleasant to see. This absence, however, resulted in no loss of information upon all that occurred on the first day, as the Secretary of the Board was on the ground, and from him, as a disinterested and highly competent witness, all necessary facts were obtained.

The show of cattle was, by his report, and by general consent, admitted to be one of the finest, if not the very best ever made by any of the county societies. It would unnecessarily prolong this report to do justice in detail to the animals presented, and it is deemed enough to say that as a whole this part of the exhibition was very gratifying, and deserving of unqualified commendation. In the department of oxen, the show was particularly excellent. It is evident that western Massachusetts may compete successfully with any portion of New England in raising cattle for the farm or the stall.

The ploughing, drawing and other matches of skill or strength, are said to have been well contested. The manner of conducting these branches of competition, and the result of them, probably does not vary in most of the counties of the State.

The show of horses, and the contest of trotting, on the morning of the second day, drew a large concourse of spectators. Though there were several good horses on the ground, some disappointment was felt that the number was not greater, and the quality superior. It was expected that, in a section of the State where the advantages for rearing colts are so good, and so near to the State of Vermont, where a large proportion of the New England horses are raised, a larger and better representation would have been made. Though fair, it was not superior to what is often seen in some of the eastern counties.

The collection of vegetables, fruits and flowers, though not large, was good. The varieties of apples, pears and peaches, though not numerous, evinced taste and success in horticulture. The show of butter and cheese was meagre for a section where pasturage is so abundant and so fine. The manufactured articles presented spoke well for the skill of the mechanics of that region. The specimens of domestic industry did honor to the ladies of Franklin, but were not as numerous as they should

have been. The samples of bread were excellent, and it is worthy of special remark, that the first premium for brown bread, and one of the premiums for wheat bread, were won by two little girls, one eight years of age, and the other twelve. If the premiums for bread and butter were offered to young ladies, under eighteen or twenty years of age, in all our societies, would not the effect be good?

The annual address was delivered by the Secretary of the Board, and was listened to by a large and intelligent audience with perfect attention. Of the address no further remark will be made than to recommend its publication in full. The services in the church were of a high order. The festival closed with a dinner, after which addresses were made by Josiah Fogg, the president of the Society, His Excellency the Governor, Mr. Flint, Geo. T. Davis, Whiting Griswold, your delegate, and one or two others, the secretary of the society acting as master of ceremonies. The best feeling prevailed, and the banquet was social and genial.

The anniversary, as a whole, was eminently successful. The society appears prosperous and spirited. The president, Mr. Fogg, and the secretary, Mr. Grennell, are enthusiastic and energetic. The large concourse which attended the festival indicates a deep interest in the operations of the association. If a plan, now before the managers of the society, to secure a permanent location for its exhibitions, is successful, a new impulse will be given, and a more complete condition of prosperity can be reported hereafter.

It ought to be added, that the cordial and respectful manner in which the undersigned was received, satisfied him that by the farmers of Franklin the Board of Agriculture is appreciated as it deserves.

GEO. MARSTON.

BERKSHIRE.

Agreeably to the appointment of the Board of Agriculture, the undersigned had the pleasure of being present on the first day of the cattle show and fair of the Berkshire Agricultural

Society, on the 1st of October last. It was one of the most glorious of our autumn days, and the beautiful grounds of the society were clad in the richest livery of foliage and verdure. There was a fine display of cattle and stock of all varieties. The products of the dairy, which may well be a subject of pride in Berkshire, were nobly represented. And the hall exhibited ample evidence of the ingenuity and industry of both sexes of the neighboring population, in the manufacture of articles of utility, of curiosity and of beauty.

The undersigned regretted sincerely that his engagements prevented him from remaining to witness the display of horses and the ploughing-match on the second day, and to listen to the eloquent address of E. W. B. Canning, Esq., of Stockbridge, on the third day of the fair. He is assured, however, that they were well worthy of the occasion, and that the forty-sixth annual cattle show of the Berkshire Society was full of encouragement and of promise to the honored cause of agriculture in Western Massachusetts.

Robert C. Winthrop.

HOUSATONIC.

By the appointment of the Board of Agriculture, I attended the annual exhibition of the Housatonic Agricultural Society, at Great Barrington, September 24th, 25th and 26th.

The high reputation attained by this flourishing and progressive society, and the acknowledged cordiality and hospitality of its members, awakened expectations which were more than realized; and I take this opportunity to acknowledge my obligations to the officers of the society, and members generally, for the kind attentions bestowed to render my visit pleasant and agreeable.

The society have, the last season, erected a commodious building near the west side of their grounds, admirably adapted to their purposes. To commence at the foundation, it is raised ten feet from the ground, and the space under the building is divided into apartments that are rented to caterers for the

crowd. The interior of the building, with the exception of two small apartments for the officers, is one room fitted for the display of the usual indoor department of the exhibition, with a gallery extending entirely around it.

On the east side are two piazzas the length of the building, both giving an excellent view of the entire grounds; and on the roof a deck with balustrades, affording space for about one thousand persons, from which one has not only a view of the grounds, but some of the finest scenery to be found in the State.

The first day was devoted to the show of cattle, sheep, swine and poultry, together with manufactured articles, fruit, vegetables, &c.

The display of oxen was not large, but included some fine specimens. Of cows there was quite a number, but I observed none of marked distinction. Young cattle predominated in number, and were superior in quality; one could but observe the peculiar points that designate the several popular varieties of the English breeds, and some young Durham bulls were strong evidence that the motley race of cattle, of every form and color, would soon be known only by their history.

The display of sheep was large, but chiefly of the varieties bred for mutton; among them were some beautiful pure blood South Downs, from the flock of Col. Joseph Wilcox and son, of Sheffield; also some fine animals of the long wool varieties, of which I was unable to learn the breeds.

There was a fair number of swine on exhibition, but more attention must be paid to them before they can compare favorably with the improved breeds displayed by some of the societies.

The poultry were of good quality, and undoubtedly will find large and willing committees to pass judgment on them at our time-honored Puritanical festival.

The exhibition of the second day opened with a foot race, which was contested by several fast young men.

The show of horses commenced with a trotting match, which brought out a number trained for the market, that contested nobly for the premiums offered them; the best time made was three minutes twenty-five seconds, but in justice to the horses it should be mentioned, that the track was new, and the day preceding the fair, rainy, leaving it in bad condition.

Next in order was the exhibition of colts, showing a large number, and many of them of uncommon beauty.

Then came thirteen pairs of superb farm horses, either pair worthy of special notice.

Carriage horses were next on the programme, and were represented by three pairs, well calculated to please the man of taste.

At the solicitation of the committee, a beautiful and finely matched pair of horses, owned by David Leavitt, Esq., were driven upon the track, whose equals would doubtless be looked for in vain in the United States. A few nice single horses were then displayed; after which the track was cleared for an exhibition of equestrianism by the ladies, thirteen of whom entered the arena; most of them were bold and dashing riders, whose grace and beauty made me regret that I could not furnish the Secretary of the Board of Agriculture with their names.

The third day was commenced with the ploughing-match, if turning the turf to the depth of six inches or less, can be termed ploughing. I found that the views of the officers and the committee were such, that not one of them would permit of such an apology for ploughing being perpetrated on their farms. The very fact that such work neither requires the skill of the manufacturer nor the ploughman, and is not of practical use, should deter societies from allowing premiums for it.

In the hall the exhibition of fruits and vegetables was small, but included some fine specimens. Bread, butter and cheese, good in quantity and quality.

Among the fancy articles were noticed some picture frames and several beautiful bouquets, that reflected credit on their originators.

The most important of agricultural implements, was a highly practicable and durable corn-sheller.

At eleven o'clock the audience assembled in the building of the society, and listened to a dedicatory address, by C. N. Emerson, Esq., which was followed by an agricultural address, by George E. Waring, Jr., New York, containing many valuable suggestions. The president then introduced the distinguished American poet, William C. Bryant, whose remarks were listened to with intense interest.

The annual festival of the society was brought to a close by the announcing and distribution of the premiums.

The show was said to have surpassed any of the preceding efforts of the society. The spectators were estimated at over ten thousand persons, and the whole fair passed off without accident or untoward occurrence to mar the festivities of the occasion; reflecting much credit upon the skill and good management of the enterprising and highly efficient officers.

THOMAS J. FIELD.

NORFOLK.

Through the politeness of the officers of the Norfolk County Agricultural Society, who extended to me an invitation to attend their annual exhibition and festival, holden at Dedham, on the 30th of September and 1st day of October, I was present, and on learning that Col. J. H. W. Page, the delegate appointed by the Board of Agriculture, was unavoidably absent, at the request of the society, I sketched down briefly some prominent items, which with leave, the following report of the exhibition is submitted.

The weather on the first day was unpleasant, being rainy and cheerless, which, however, did not prevent a large collection of animals, fruit, flowers, &c., from the various parts of the county, showing a determination on behalf of the members of the society to be on hand, and do what they could to promote an agricultural interest in this section.

The various committees were promptly on hand, and attended to their duties in examining articles, awarding premiums to such objects as were deemed worthy. All was bright and cheerful within their spacious building, while the elements tended to make things gloomy without.

Not so the second day,—the sun rose in its splendor, and all nature beamed forth with joy and gladness; there had not been rain enough to make the streets muddy, but just enough to cool

the air, lay the dust, and clean the foliage of the beautiful shade trees which adorn the village of Dedham.

Promptly in the morning, the ploughing-match was held at the stated time, where much interest was felt by the competitors to do the work well, and exhibit the merits of the various teams and improved ploughs; the land being well adapted, excellent work was generally performed.

Next in order came the spading-match, and lustily did the sinewy arms turn over the tough sod, and show what a good spade could perform when well directed.

The exhibition of horses next engaged attention.

This society, through a far-sighted, liberal policy and laudable enterprise, have the past year added a fine piece of land to its already beautiful grounds, on which is laid out a track wherein to exhibit their horses, stock, &c., which never can be done in pens or among a promiscuous crowd, however cautious the hand that guides them.

A large quantity of fine pears were exhibited, as well as other fruit, vegetables and cut flowers; of the last, one contributor from Needham, (Mr. Hunnewell,) deserves much praise; one table was literally covered with the rare exotics from his elegant residence. No pains or expense could have been spared by him to adorn their show.

The pens contained many fine specimens of cattle, both native and foreign stock, fine hogs, fancy fowls, &c. South Down sheep were there, also some other breeds, all exhibiting the care and attention of the fortunate owners.

Of swine, the Suffolk breed predominated; the race of "striped pigs," for which this town was formerly celebrated, seemed to have died out, their places being supplied with more orderly animals.

An address was delivered to the society, in one of the churches, by Hon. Josiah Quincy, Jr., who ably entertained the audience, by contrasting our own happy country with lands in Europe, which he had recently visited; after which a bountiful repast was provided in the upper hall of the society's building, and a large number of ladies and gentlemen agreeably spent the remainder of the day, entertained by speeches, music, and last, though not least, an announcement of the sums awarded as premiums and gratuities.

The whole passed off happily. Much credit is due to the Hon. Marshall P. Wilder, the president of the association and member of this Board, who, in his prompt, urbane and happy manner, devotes time, money and talents to the noble cause of agriculture.

W. G. Lewis.

BRISTOL.

The undersigned, having been appointed by the Board of Agriculture to attend the cattle show and exhibition of the Bristol County Agricultural Society, would respectfully report: That the thirty-third anniversary of this society was held at Fall River, Wednesday and Thursday, the 1st and 2d of October last. Owing to my connection with the Middlesex Agricultural Society, which held its annual fair on the day previous, I was unable to be present on the first day of the Bristol show. My colleague, who represents that society at this Board, was present on that day, and has kindly furnished me with the following sketch, as the results of his observations: "Stock, not so numerous as on some former occasions, but there were many good animals, cows, heifers, bulls and a large number of working oxen. A few fine blood animals were exhibited, but most of them were native or grade; there were more swine and sheep than usual; of horses, mares and colts a goodly number, many more than usual, were exhibited. Poultry in variety. Ploughing-match was well contested by about fifteen teams, work well done. Spading-match for second time there, was well contested. Drawing-match was well contested by many well-trained and excellent oxen, and by some very splendid horses."

The animals which were exhibited on the first day having been removed from the pens, my attention was first directed to the exhibition of fruits, flowers, &c., at "Music Hall." This large hall was tastefully and appropriately fitted up, containing as many tables as could conveniently be arranged, all of which were literally loaded with beautiful specimens of almost every variety of fruit grown in our climate.

The season, as is well known, was unfavorable to the apple, still there were numerous varieties, and many very fine specimens.

The display of pears was quite extensive, and contained many samples not easily surpassed. Of grapes, the display of both foreign and native was large, and many of the specimens of great excellence, giving evidence of the grower's care and skill. The many large and remarkably handsome bunches of foreign grapes constituted one of the chief attractions of Music hall.

City hall was opened on the occasion, and devoted to the display of domestic and household manufactures; the products of the field, garden and dairy, implements of husbandry, &c. Here were exhibited several samples of American linen goods from the Fall River linen factory, which, in point of texture and finish, would compare favorably with the best descriptions of foreign manufacture. Also, many samples of Britannia and silver plated ware, farming implements, carriages, printed goods, &c. Products of the field and garden were not numerous; there were some specimens of wheat, rye and corn, which were very fine. Of butter and cheese the show was not extensive, but contained several samples of excellent quality. In this connection it should be mentioned that there were numerous samples of very excellent bread.

The banquet took place at about half-past one o'clock, in a spacious hall neatly fitted up for the occasion, where tables were spread for about six hundred people. At the close of the dinner, interesting speeches were made, and sentiments given by the president, Dr. Nathan Durfee, the vice-president, Hon. John Daggett, Hon. J. H. W. Page and others, intermingled with which, reports were made by the awarding committee.

Sam'l Chandler.

PLYMOUTH.

Agreeably to appointment, I attended the Plymouth County agricultural cattle show and fair, at Bridgewater, on the 24th and 25th of September. The morning of the first day of the exhibition was unfavorable, but by the time appointed to com-

mence operations, the sky cleared, and the remainder of the day was pleasant. As we approached the agricultural grounds the people were seen coming from all directions, with their teams, stock and the products of the land.

The first thing that meets the eye, on leaving the village, is the magnificent hall, erected by the society the present season, for agricultural purposes. This building is 135 feet long, and 65 feet wide. On the top was the flag of the country waving, with a beautiful representation of an ox stamped upon it,—the proper insignia of the farmer. This building is divided into two spacious halls, an upper and a lower one, with convenient rooms for committees. It stands upon an eminence on the west side of the society's land; when finished, it will probably compete with any of the kind in the State. The whole of the lower hall was adorned with various articles, both useful and ornamental. There seemed to be almost every variety of vegetables for culinary purposes, many of them of a large growth. There was quite a variety of beautiful flowers, so exquisitely arranged as to gratify both the eye and the olfactories. Many kinds of rich, luscious fruits, such as peaches, pears, apples, grapes, &c., were exhibited, which showed that the people of Plymouth county have a good taste.

There was a large collection of manufactured articles, some to show the delicate handicraft of the artificer, others for permanency and utility.

There were fewer agricultural implements than we are accustomed to see at county shows. The number and excellence of their implements, indicate the progress of agriculture more than any thing else.

The ploughing-match commenced at 10 o'clock. Sixteen teams entered for premiums. The land was marked out along by the river, on the interval portion of the society's land, a grand spot for that purpose, scarcely a stone to interfere with the plough. One yoke of oxen to a team, the ploughman the driver. The work was done in a farmer-like manner.

Next came the drawing-match, on the track at the hill in front of the hall. The spading took place at the same time, north of the ground just ploughed. Thirteen competitors entered for premiums; twelve from the Emerald Isle and one Yankee. After the ground was marked out, twenty-five

minutes were given them to perform the work in. They stripped off their outer garments and prepared for the conflict. When the word was given, they struck in their spades and labored as though all their earthly hopes depended upon the result. The shortest time any one did the work in, was fourteen minutes, the longest, twenty-one minutes. This was a novel and exciting scene to many of the spectators. I think, however, spading can never come in competition with the plough, particularly in breaking green sward.

I did not witness but a small part of the drawing, but was informed by those that did, that the work was well done. The number of cattle exhibited for premiums was not large. There were some fat cattle present. There was a fine pair of oxen brought there by Mr. Goodspeed, the superintendent of the State almshouse in that place, weighing between four and five thousand pounds. There were a number of bulls present of various breeds, some nice ones. One of the Durham blood, very superior. But little young stock offered, and the number of dairy cows was small. One beautiful, red, hornless cow was exhibited, and sold in the pen for $125. There was not a large number of swine exhibited, but some of them were fine specimens of that class of animals. If there was poultry on the ground, it escaped my observation. There were but few lots of butter and cheese presented, but what were, judging from the eyes and not the taste, gave evidence that the makers of them were not unused to their business. I presume that dairying cannot be carried on in Plymouth county with as much success and profit as in the more mountainous counties of the State, where the soil is richer and deeper. Good pasturage is indispensable in this department of husbandry.

The afternoon was wholly devoted to the horse exhibition. As this is the load-stone that draws people together on these occasions, more than any one thing,—or perhaps all others combined,—of course, the spectators were much more numerous than in the forenoon. This scene was animating and exceedingly exciting, as it usually is. There was a number of horses entered to test their trotting powers, and to compete for the premiums. Many of them trotted well, but no one performed his mile in three minutes. The track is unfavorable for great speed, as there is quite a hill in front of the hall. It was thought

that several of the horses would make their mile in three minutes on the Boston course.

A machine for digging rocks was then put in operation, which, it is said, worked with wonderful power. I did not witness the performances.

The morning of the second day was cool, but soon grew warmer, and the day was very beautiful, and by 10 o'clock the grounds seemed almost covered with moving human beings, and still they were coming. The road seemed filled with footmen, horsemen and carriages. It was said to be the greatest gathering that had ever taken place at their autumnal festivals.

Every thing was in accordance with the wishes of the people; the weather was fine, the sky clear, and the air balmy; there was neither mud nor dust to annoy the traveller. Many, undoubtedly, came to see their new hall and be at its warming. The most attractive scene of the whole show was to take place at 10 o'clock, the exhibition of female equestrianism, which did not take place till 11 o'clock. Twenty-six ladies entered their names for premiums; but thirteen appeared on the ground. The cavalcade left the village about 11 o'clock and went around the track once, each lady accompanied by a gentleman, and presented themselves before the judges' stand. By order of the judges they performed a variety of evolutions, riding in pairs, in quartets, all together, and each lady alone, riding slow or fast, as best suited her taste and convenience. After performing an hour or more they left the ground. These equestrians performed their parts,—so far as we are capable of judging,—well. Many of them labored under disadvantages. Their horses were not thoroughly trained to the saddle. There were a few good horses, but generally they were not fit for the occasion. The question comes up, Whether this is the proper place for ladies to be exhibited for premium? Whether the finest of nature's workmanship, should be shown for money, in connection with the grossest animals and the products of the land? I think not.

I have too much respect for ladies to mix them up with such trash. It is not calculated to raise the standard of public morals, but the contrary. There is another objection, though of a minor kind. All ladies cannot enter the field of competition, though they could ride like Cossacks, they have not the

means to meet the expense of preparation. It seems to me that this part of the show has but little to do with agriculture. If the public taste demands a pastime of this character, let it be entirely separate and distinct from our autumnal cattle shows. Every young lady ought to practice horseback riding for sanitary purposes, as well as for amusement, and she ought to learn to sit a horse gracefully and elegantly. I would, however, suggest, if ladies must be exhibited for the gratification of the public, and premiums offered in order to induce them to enter the lists, that there be a pedestrian, rather than an equestrian performance; let there be a track made and a premium offered for the best female walker, and she that accomplishes it the most gracefully receive the reward. This will have a permanency to it. This will last through life, for most of the young ladies will find after they have taken to themselves the lords of creation, and are surrounded by a family of prattlers, that most of their work will have to be done on foot rather than on horseback.

At the close of the equestrian performance, a large procession formed from the judges' stand, and marched to the fine music of the Pembroke Band to the dining tables in the upper hall, where about five hundred sat down to an excellent collation. After having satisfied the animal wants, the president rose and welcomed the audience in a pertinent and animated speech. He then introduced his excellency, Gov. Gardner, and other gentlemen, who made brief and appropriate speeches, filled with humor and good sense; then followed the reading of the premium list, when your delegate left for the cars.

Wm. Parkhurst.

TOWN FARMS.

On the 17th January, 1856, I directed the following circular to the selectmen of the different towns in the State, in the hope of exciting some interest in conducting experiments on the town farms under their charge, or under the direction of the overseers of the poor, viz.:—

BOARD OF AGRICULTURE, SECRETARY'S OFFICE,
January 17, 1856.

Gentlemen:—At a meeting of the Board of Agriculture, held at the State House on the 5th of December, 1855, it was voted, "That the Secretary address a circular letter to the selectmen of every town in the Commonwealth, recommending that each town possessing a town or poor farm, make the same, as far as possible, a model or experimental farm."

It must be evident to you that, owing to the difference of soils and the influences of climate in different parts of the State, no experiments made in any one locality, however carefully they may be conducted, can be of universal application or value. Hence, a model or experimental farm in any one part of the State, though it may be of importance and value in that vicinity, can hardly be expected to be of equal value in other sections. It is believed that many thousand dollars are annually lost by individuals, in the injudicious application of manures, and by the cultivation of crops of less value than others which might be adopted. By a course of judicious experiments, carefully conducted, on the town farms in every part of the State, many useful ideas might be suggested, without expense to the State or to the towns by which they were made; and these experiments would be brought, from year to year, to the knowledge of all who might wish to profit by them. These experiments might be intrusted to a committee specially appointed for the purpose, or to the selectmen, or the overseers of the poor.

I shall be happy to afford all the assistance in my power, by way of

suggestion or otherwise, to any towns by which this proposition shall be adopted, and to furnish to such committees having charge of the matter, the results of the experiments made on the State Farm at Westborough, as reported from year to year by the Board of Agriculture for distribution over the State; and I hereby request the selectmen of all towns where this course shall be pursued, or the committees so appointed, to notify me of the fact, when the Reports of the Board of Agriculture will be forwarded to them.

Very cordially and truly,
Your obedient servant,

CHARLES L. FLINT,
Secretary of the Board of Agriculture.

In reply, I have received the following, being a report of the Overseers of the Poor to the town of Princeton, viz.:—

At the last March meeting, in 1856, the overseers of the poor were constituted a committee to make such improvements in the management of the pauper farm, with a view to its increased productiveness, as they should deem for the best interest of the town.

That there should be no embarrassment in the way of the committee in carrying out any measure they might adopt, in furtherance of the design of their appointment, the town, with great liberality, granted them unlimited powers, as to the amount of expenditure. The committee, feeling that whatever measures of improvement they might take, were liable to failure, and having no desire to incur expense, without a reasonable prospect of an adequate return, were cautious in their outlay, and have expended the sum of fifty and $\frac{39}{100}$ dollars only.

This sum has been expended for fertilizers, as follows:—

1,287 lbs. of Peruvian Guano, ...	$36 64
600 lbs. of De Burg's Phosphate of Lime, .	13 75
	$50 39

These fertilizers have been applied to the land as hereafter described, viz.: On the field east of the house, called the old house lot, was spread broadcast, and ploughed in, three hundred pounds of guano to the acre; this was all the manure used upon this acre, except about twenty bushels of wood ashes on one part, and about five hundred pounds of plaster on another part. The ashes were used at the second

hoeing, and increased the crop three or four bushels to the acre. The plaster was used at the same time, and its effect was to better the crops, but not so evidently as the ashes. This acre produced thirty bushels of sound shelled corn. On a lot of land north-east of the house, containing two acres, was spread broadcast, and put in the hill, about forty cart loads of barnyard manure. This lot was planted with corn, about the twentieth of May, and produced seventy-eight bushels of sound shelled corn, equal to thirty-eight bushels to the acre.

Comparing these two fields of corn, and estimating the barn manure worth one dollar the load, or twenty dollars the acre, it is found that the cost of manure, per bushel of corn, is fifty-two and $\frac{63}{100}$ cents; and estimating the guano at the cost, nine dollars, the twenty bushels of ashes at two and $\frac{50}{100}$ dollars, the plaster at two dollars and fifty cents, the cost of the fertilizers on this lot would be fourteen dollars, equal to forty-six and $\frac{66}{100}$ cents the bushel of corn, showing a difference in favor of guano, ashes and plaster, of five and $\frac{97}{100}$ cents the bushel, or one dollar and eighty cents the acre; but if we take into account the additional labor expended in spreading and carting the barn manure, it would add to the balance at least two dollars, showing a profit in manuring with guano, ashes and plaster, in the manner described, of nearly four dollars per acre over barnyard manure.

Another trial with corn was upon land south-west of the house; this lot, containing one hundred and eighty-nine rods, was ploughed about the tenth of May, and planted upon the sod about the twentieth of May; was manured with six hundred pounds of De Burg's phosphate of lime, costing thirteen and $\frac{75}{100}$ dollars, and was applied to the corn one-half in the hill, and one-half at the second hoeing. Three rows across the middle of this lot, measuring six and $\frac{75}{100}$ square rods, was planted without any manure whatever, and produced four quarts of poor corn, or at the rate of two and $\frac{96}{100}$ bushels the acre; while the remaining one hundred eighty-two and $\frac{25}{100}$ rods produced thirty-five bushels, or at the rate of thirty and one-half bushels the acre, showing that the crop was almost wholly due to the phosphate.

The cost of manure upon this lot was equal to thirty-nine and $\frac{28}{100}$ cents the bushel of corn, thirteen and $\frac{35}{100}$ cents less than that manured with barnyard manure, and seven and $\frac{38}{100}$ cents less than the corn manured with guano, ashes and plaster.

The next trial with guano was upon a lot of land west of the barn, containing one acre, sowed to winter rye in September, 1855. The superintendent staked off through the middle of this lot, land as near the average quality as possible, and sowed upon it in April, guano,

at the rate of three hundred pounds per acre. At the time of harvesting, two square rods of this rye, manured with guano, and weighed with the straw, produced forty-seven and $\frac{50}{100}$ pounds. After drying and threshing, the product was eight quarts of rye, and thirty pounds of straw, equal to twenty bushels of grain, and twenty-four hundred pounds of straw per acre. Two square rods not manured, produced, at harvesting, twenty-eight pounds, including straw and grain, and, after drying and threshing, five quarts of rye, and sixteen and $\frac{75}{100}$ pounds of straw, equal to twelve and one-half bushels of grain, and thirteen hundred and twenty pounds of straw the acre. Estimating the rye at one dollar a bushel, and the straw at eight dollars a ton, the produce of the land, manured with guano, would come to twenty-nine and $\frac{60}{100}$ dollars the acre; the produce of the land, which was left without guano, would come to seventeen and $\frac{78}{100}$ dollars the acre, leaving a difference in favor of the guano of eleven and $\frac{82}{100}$ dollars per acre. The cost of the guano per acre was nine dollars, which, deduct from eleven and $\frac{82}{100}$ dollars, leaves a net profit on the lot manured with guano, of two and $\frac{82}{100}$ dollars per acre.

The committee manured a piece of rye in the old house lot, upon the same plan as the lot just described. The two rods, manured with guano, produced fifty-one and $\frac{25}{100}$ pounds of straw and rye at harvesting, and the two rods left without manure, produced, at harvesting, including straw and grain, thirty-two and $\frac{25}{100}$ pounds.

Comparing these lots with the other west of the barn, the two rods manured produced at the rate of thirty-one and $\frac{93}{100}$ dollars the acre; the two rods without manure produced at the rate of twenty and $\frac{49}{100}$ dollars the acre, a difference in favor of guano, of eleven and $\frac{44}{100}$ dollars; deduct nine dollars, the cost of the guano per acre, leaves two and $\frac{44}{100}$ dollars net profit on the guano per acre; averaging the two experiments, the net profits on manuring with guano would be two and $\frac{63}{100}$ dollars to the acre.

There was sown, in April, upon a lot of land west of the house, one acre of wheat; it was manured with ten cart loads of poor compost, worth fifty cents a load, and three hundred pounds of guano, costing nine dollars, all spread broadcast, and ploughed under. The produce of the acre was twenty bushels of good wheat.

In the estimation of the committee, if twenty cart-loads of barnyard manure had been spread upon this land, costing twenty dollars, the increase in the crop would have been little, if any; if so, this trial shows a difference in favor of guano, of six dollars an acre. The committee tried an experiment by sowing guano broadcast at the rate of three hundred pounds the acre, on a lot of grass land east of

the house; two square rods of this grass weighed, at the time of cutting, when green, sixty-six pounds; the same grass, when sufficiently dry to cart, weighed thirty pounds, equal to two thousand four hundred pounds per acre, which, at one-half cent the pound, amounts to twelve dollars. Two square rods, not manured, weighed, when green, thirty pounds; when dry the same grass weighed fifteen pounds, equal to twelve hundred pounds of hay per acre, which, at one-half cent the pound, comes to six dollars. Although the guano, in this case, doubled the crop of grass, it failed, at the estimated price of hay, to pay for itself; but, calling hay worth fifteen dollars the ton, the increased product would just pay for three hundred pounds of guano per acre. If the guano shows itself next year, it may yet pay, estimating hay at ten dollars a ton.

The rye field west of the barn was seeded down in September last, with a view of testing the effect of the guano upon the grass the next year.

In reviewing these experiments, the committee feel that they have been successful, and they cannot but believe it for the interest of the town to pursue them further, and make the coming season a larger outlay for fertilizers than they have heretofore done. The land of the farm is greatly exhausted, and will be more so, unless some resort is had to measures for improvement; and the undersigned know of no better way to accomplish this desired object than to pursue the plan, or some similar one, which they marked out by their course last year, until the increase of crops, and their consumption on the farm, shall produce manure enough to supply its wants.

JOHN BROOKS,
ALBERT C. HOW,
EBEN. SMITH,
Overseers of Poor, and Committee for improving Town Farm.

I take this opportunity to urge again the importance of careful experiment upon the town farms in every town in the State. This course would bring the knowledge of the results obtained, home to the farmer's own door, as it were, and be the means of interesting many in the improvement of their lands, who now fail to arrive at satisfactory results for the want of the assistance which properly conducted experiments would give. It would commend itself to the good judgment of intelligent farmers, while the expense to the town would be too insignificant to be felt by individual citizens. The importance of care-

ful experiments in every locality in the State, is now almost universally admitted, and the good which may be accomplished in this manner must be apparent to all. Suppose, for instance, a superior blood male animal were kept for the purpose of breeding at the town farm in every farming town in the country, to which the farmers of the town could have access at a reasonable charge, is it not evident that the value of the stock of the town would be increased, as its quality was improved? The cost of obtaining and keeping might be an item sufficient to put it beyond the power of an individual farmer in the town, but to all collectively, it would be but small, while all could derive a benefit from it.

A careful series of experiments in manures and crops, like those stated above, would be the means of saving thousands of dollars to the Commonwealth, which are now wasted in fruitless experiment, conducted without the system and co-operation which experiments on the town farms would give, especially if these experiments were continued several years under the same direction and control.

The importance of cultivating seeds for the purpose of supplying a neighborhood or a town is, also, too apparent to need illustration, and this culture might be undertaken, in many instances, with profit to the town, upon the town farm, and with comparatively little expense, if not, indeed, with direct profit to the farm itself. As already stated, in another place, the farmer is often compelled to purchase his seed of dealers who cannot themselves trace its history, and the consequence is, often, the loss of a crop and the labor of cultivation, from the fact that much of the seed, being old, fails to germinate, when, of course, a serious loss is incurred by the farmer, which, as it affects many individuals, becomes a matter of great public importance.

Few are aware how extensive and serious are the failures throughout the State, in consequence of bad seed, and these failures, or many of them, might be avoided by turning attention to seed culture upon town farms, where they can be under proper management. The advantage of this arrangement would be, that farmers could purchase their seed with greater confidence, since they would know how much reliance to place upon it. If it were found to be impracticable or inconvenient,

to raise a large variety of seed on any one farm, certain kinds could be raised in one town, and certain other kinds on the farm of some adjoining town, and an exchange effected to the satisfaction of all concerned.

This subject is deserving of the careful consideration of the farmers of every town, and a little concert of action on the part of those interested, would soon enable them to mature some practicable and judicious plan of action.

I shall be happy to receive reports from other towns, similar to that from the town of Princeton, and to co-operate with any interested in the matter, in any practicable manner in my power.

C. L. F.

APPENDIX.

RETURNS OF AGRICULTURAL SOCIETIES FOR 1856.

FINANCES.

SOCIETIES.	Amount received from the Commonwealth.	Income of Fund.	New Members and Donations.	All other sources.	Whole amount of Receipts for the year.	Amount of Premiums and Gratuities offered.	Amount of Premiums and Gratuities awarded.	Amount of Premiums paid out.	Current expenses of the Society for the year.	Whole amount of Disbursements for the year.	Value of Real Estate belonging to the Society.	Amount of the Permanent Fund (par value).	Total amount of all the property of the Society.
Massachusetts, .	$600 00	$1,944 50	–	$1,070 00	$3,614 50	$3,200 00	$2,474 72	$2,351 68	$1,496 89	$3,848 57	..	$24,100 00	$24,100 00
Essex, . . .	600 00	621 12	489 00	767 98	2,478 10	2,181 00	1,310 00	1,033 08	1,060 20	2,093 28	–	9,838 73	12,098 59
Middlesex, . .	600 00	200 00	50 00	207 00	1,057 00	850 00	820 00	807 00	250 00	1,057 00	$2,000 00	3,000 00	5,000 00
Middlesex South, .	600 00	120 16	316 00	525 00	1,591 16	1,069 50	626 60	–	450 00	4,346 99	6,700 00	7,400 00	7,400 00
Middlesex North, .	600 00	69 45	258 50	675 87	1,603 87	573 00	494 63	638 53	435 01	1,153 06	–	3,000 00	–
Worcester, . .	600 00	370 00	1,518 00	10,108 77	12,595 77	1,273 00	633 00	633 00	600 00	10,477 23	30,000 00	5,200 00	35,200 00
Worcester West, .	600 00	179 15	18 00	–	797 15	703 00	504 99	480 74	272 49	753 23	–	3,239 85	3,239 85
Worcester North, .	600 00	187 57	110 00	–	897 57	699 75	588 79	549 71	184 53	776 04	–	3,200 00	3,200 00
Worcester South, .	–	84 27	189 50	100 00	373 77	474 00	270 41	159 95	94 50	254 45	–	1,519 00	1,749 00
Hampshire, Franklin and Hampden,	600 00	343 83	265 00	701 57	1,910 40	1,017 00	839 93	606 50	984 63	5,128 54	4,200 00	3,652 00	8,052 00
Hampshire, . .	600 00	331 52	242 39	–	1,203 82	570 00	473 91	418 88	936 00	1,042 55	–	3,637 93	3,637 93
Hampden, . .	600 00	272 06	425 00	1,096 45	2,393 51	1,177 00	947 59	1,477 65	1,391 87	2,769 52	–	1,750 00	4,820 60
Franklin, . .	600 00	218 00	120 00	256 93	1,194 93	670 25	605 61	555 53	490 00	1,105 00	–	4,710 50	–
Berkshire, . .	600 00	42 00	260 00	2,859 19	3,761 19	1,146 00	1,171 00	1,171 00	1,450 41	3,712 76	7,000 00	1,000 00	8,000 00

Housatonic, . .	600 00	314 00	61 00	1,524 00	2,499 00	917 00	921 00	913 00	3,769 49	4,490 44	8,500 00	6,250 00	14,750 00
Norfolk, . . .	600 00	–	420 00	7,205 83	8,225 83	2,150 00	897 00	832 50	6,237 26	7,069 76	10,414 00	–	10,414 00
Bristol, . . .	600 00	270 20	195 00	1,611 15	2,676 35	1,342 00	826 50	826 50	1,194 48	2,020 98	–	3,640 00	3,640 00
Plymouth, . .	600 00	611 45	690 00	1,971 66	14,163 94	1,469 00	1,258 95	1,100 47	1,268 00	14,052 40	14,500 00	14,500 00	14,500 00
Barnstable, . .	366 00	91 69	1,070 00	115 87	1,643 47	446 00	291 33	291 36	265 00	1,366 50	800 00	3,550 00	3,550 00
Nantucket, . .	200 00	30 00	114 00	520 42	864 42	212 00	216 00	133 50	231 60	365 10	–	1,030 00	1,529 32
Hampden East,	377 00	–	102 00	86 00	–	–	–	–	49 07	–	–	–	1,885 00
Totals, . .	$11,113 00	$6,330 88	$6,913 30	$31,403 69	$65,546 75	$22,223 50	$16,151 95	$14,981 08	$23,161 43	$67,883 31	$84,114 00	$104,253 01	$166,766 29

PERMANENT FUND—HOW INVESTED.

MASSACHUSETTS.—Stock in Boston banks.

ESSEX.—Bank stock, notes, railroad bonds, and mortgages.

MIDDLESEX.—Bank and railroad stocks, and notes secured by mortgages.

MIDDLESEX SOUTH.—Real estate in Framingham, for the Society's use, with the appurtenances, fixtures, pens, &c., and money at interest on personal loans.

MIDDLESEX NORTH.—Notes at interest.

WORCESTER.—Bank stock and notes.

WORCESTER WEST.—In promissory notes and cattle pens.

WORCESTER NORTH.—Bank stock, notes, cattle pens, &c.

WORCESTER SOUTH.—Loaned on collateral security to double the amount of the fund.

HAMPSHIRE, FRANKLIN AND HAMPSHIRE.—Bonds and mortgages.

HAMPSHIRE.—Loans on mortgages of real estate, $2,550; loans on personal security, $73.13; notes of life members, on interest, $364.64; Agricultural Hall, $382.85; fixtures, cattle pens, tables, &c., at cost, $164.90; cash in the treasury, $102.41.

HAMPDEN.—Notes.

FRANKLIN.—Notes and mortgages.

BERKSHIRE.—In promissory notes.

HOUSATONIC.—In notes against about 375 different individuals, for $16.67 each, on annual interest, and thirty-four acres of land, and buildings.

NORFOLK.—In real estate owned and occupied by the Society.

BRISTOL.—In Taunton Bank stock, and notes against Bristol County.

PLYMOUTH.—Invested in real estate, being thirty-one acres of land, fences, &c., $6,000; buildings thereon, 135 feet long, 60 feet wide, and 33 feet high, $8,500.

BARNSTABLE.—Notes of hand, $1,500; land, $800; pens on the land, $200; cash, $1,000.

NANTUCKET.—In personal notes, bearing interest, payable annually.

HAMPDEN EAST.—No statement.

ANALYSIS OF PREMIUMS AND GRATUITIES AWARDED.

FOR FARMS, &c.

SOCIETIES.	For management of farms.	For draining.	For subsoil ploughing.	For plough-ing at Exhibition.	For spading.	For reclaiming swamp lands.	For manures, and experiments with them.	For forest trees.	For orchards of all kinds.	Am't offered for farm improvements.	Am't awarded for farm improvements.	Amount paid for farm improvements.
Essex,	$25 00	$15 00	–	$121 00	–	–	–	–	–	$560 00	$234 00	$211 00
Middlesex,	25 00	–	–	66 00	$15 00	–	–	–	$28 00	167 00	134 00	134 00
Middlesex South,	56 00	–	–	48 00	–	$25 00	–	–	31 00	335 00	56 00	56 00
Middlesex North,	–	–	–	51 00	–	–	–	–	–	–	–	–
Worcester,	–	–	–	76 00	–	–	–	–	–	100 00	–	–
Worcester West,	–	–	–	36 00	–	–	$10 00	–	–	60 00	10 00	10 00
Worcester North,	15 00	–	–	61 50	–	–	–	–	–	15 00	15 00	15 00
Worcester South,	–	–	–	29 00	–	–	–	–	–	–	–	–
Hampshire, Franklin and Hampden,	–	–	$10 00	–	–	–	25 00	–	–	45 00	35 00	–
Hampshire,	25 00	8 00	–	28 45	–	14 00	10 00	–	14 00	141 00	99 45	97 95
Hampden,	52 00	–	–	–	–	–	–	–	–	157 00	52 00	52 00
Hampden East,	–	–	–	12 00	–	–	–	–	–	–	–	–
Franklin,	–	–	–	22 00	–	10 00	10 00	–	28 00	132 00	70 00	70 00
Berkshire,	–	–	–	47 00	–	10 00	–	–	15 00	–	–	–
Housatonic,	–	–	–	70 00	–	–	–	–	–	–	–	–
Norfolk,	40 00	–	–	69 00	36 00	15 00	–	–	20 00	234 00	55 00	183 00
Plymouth,	–	–	–	45 00	–	–	33 00	$55 00	–	131 00	133 00	69 00
Bristol,	–	–	–	65 00	–	–	–	15 00	10 00	413 00	90 00	90 00
Barnstable,	–	–	–	26 00	–	–	–	–	–	53 00	–	–
Nantucket,	–	–	–	–	–	–	–	16 00	10 00	–	–	–
Totals,	$238 00	$23 00	$10 00	$872 95	$51 00	$74 00	$91 00	$86 00	$156 00	$2,573 00	$936 45	$937 95

SOCIETIES.	Bulls.	Working Oxen.	Milch Cows.	Heifers & Calves.	Fat Cattle and Steers.	Horses.	Swine.	Sheep.	Poultry.	All other stock.	Total offered for live stock.	Total awarded for live stock.	Total paid out for live stock.
Massachusetts,	–	–	–	–	–	–	–	–	–	–	$2,290 00	$1,474 72	$1,331 68
Essex,	$62 96	$28 00	$40 00	$33 00	$47 00	$117 32	$29 00	$30 00	$34 00	–	517 00	421 28	410 00
Middlesex,	63 00	29 00	124 00	41 00	31 00	53 00	34 00	–	–	–	379 00	375 00	375 00
Middlesex South,	50 00	20 00	36 00	28 00	25 00	93 00	33 00	–	13 00	–	330 00	333 00	–
Middlesex North,	37 00	20 00	36 00	31 00	8 00	66 00	34 00	–	16 00	–	282 00	247 00	185 00
Worcester,	78 00	48 00	22 00	66 00	122 00	128 00	43 00	24 00	30 00	–	796 00	555 00	–
Worcester West,	35 00	35 00	41 00	22 00	47 00	42 00	35 00	10 00	11 00	$43 00	334 00	322 00	309 00
Worcester North,	31 00	31 00	38 00	26 00	27 00	54 00	16 50	5 00	9 00	53 50	299 00	276 00	262 00
Worcester South,	20 00	27 00	15 00	17 00	14 00	27 00	24 00	13 00	–	60 00	229 00	217 00	135 50
Hampshire, Franklin & Hampden,	39 00	45 00	23 00	41 00	43 00	191 00	43 00	29 00	19 73	102 00	555 00	491 75	475 62
Hampshire,	25 45	41 00	7 00	5 45	9 00	55 68	25 18	6 00	4 68	19 18	232 85	199 62	143 78
Hampden,	33 00	50 00	25 00	28 00	52 00	101 00	33 00	31 00	–	55 00	461 50	416 00	281 00
Hampden East,	8 00	23 00	25 00	–	24 00	59 00	18 00	9 00	7 75	–	–	–	–
Franklin,	23 00	29 00	21 00	18 50	35 00	67 50	18 00	26 00	2 00	121 00	372 00	331 00	338 00
Berkshire,	53 00	48 00	90 00	48 00	23 00	235 00	33 00	85 00	17 00	44 00	638 00	676 00	676 00
Housatonic,	24 00	52 00	30 00	21 00	18 00	96 00	21 00	57 00	12 00	62 00	393 00	393 00	393 00
Norfolk,	26 00	22 00	30 00	42 00	16 00	228 00	47 00	3 00	37 00	5 00	708 00	462 00	454 00
Plymouth,	33 00	50 70	33 00	43 60	90 00	174 00	27 00	–	20 00	–	472 00	461 70	384 55
Bristol,	54 00	57 00	35 00	14 00	52 00	91 00	18 00	22 00	20 00	–	351 00	333 00	373 00
Barnstable,	14 00	16 00	11 00	13 00	40 00	30 00	10 00	8 00	3 50	–	181 50	145 50	145 50
Nantucket,	5 00	5 00	21 00	5 00	–	16 00	3 00	4 00	10 00	–	64 00	69 00	33 00
Totals,	$716 41	$695 70	$712 00	$543 55	$730 00	$1,919 50	$555 68	$332 00	$263 66	$554 68	$9,925 85	$8,375 55	$6,768 03

ANALYSIS OF PREMIUMS AND GRATUITIES AWARDED—Continued.

FOR FARM PRODUCTS.

SOCIETIES.	Indian Corn.	Wheat.	Rye.	Barley.	Oats.	Other Grain Crops.	Grass Crops.	Cranberries.	Potatoes.	Beets.	Turnips.
Essex,	–	–	–	$10 00	–	–	–	–	–	–	–
Middlesex,	–	–	–	–	–	–	–	$50 00	–	–	–
Middlesex South,	–	–	–	–	–	–	–	2 00	$24 00	–	–
Middlesex North,	$22 00	–	–	–	–	–	–	–	–	–	–
Worcester,	–	–	–	–	–	–	–	–	–	–	–
Worcester West,	–	$5 00	–	–	–	–	–	–	–	–	–
Worcester North,	17 00	4 00	$5 00	–	$5 00	–	–	–	3 00	$2 00	$5 00
Worcester South,	–	–	–	–	–	–	–	–	–	–	–
Hampshire, Franklin and Hampden,	–	–	–	–	–	–	–	–	5 00	–	–
Hampshire,	9 00	7 00	–	–	3 00	–	–	–	7 00	–	–
Hampden,	–	–	–	–	–	–	–	–	3 00	–	–
Hampden East,	–	–	–	–	–	–	–	50	–	45	25
Franklin,	20 00	10 00	8 00	–	3 00	–	–	–	4 00	–	–
Berkshire,	22 00	33 00	24 00	14 00	24 00	$38 00	$3 00	–	24 00	3 00	5 00
Housatonic,	70 00	17 00	14 00	5 00	24 00	14 00	9 00	1 00	21 00	2 00	3 00
Norfolk,	10 00	–	6 00	–	–	–	–	–	–	–	–
Plymouth,	78 00	7 00	5 00	16 00	8 00	18 00	–	–	–	17 00	–
Bristol,	13 00	–	8 00	–	–	6 00	–	10 00	–	–	16 00
Barnstable,	10 00	7 00	5 00	–	–	–	–	–	6 25	–	3 75
Nantucket,	10 00	5 00	5 00	–	–	8 00	–	10 00	5 50	–	5 00
Totals,	$281 00	$95 00	$80 00	$45 00	$67 00	$84 00	$12 00	$73 50	$102 75	$24 45	$38 00

FARM PRODUCTS—Continued.

SOCIETIES.	Carrots.	Other Root Crops.	Amount offered for Root and Grain Crops.	Amount awarded for Root and Grain Crops.	Amount paid out for Root and Grain Crops.	Amount awarded for Broomcorn.	Any other cultivated crops.	Fruits and Flowers.	Milk.	Butter and Cheese.	Bread and Honey.
Essex,	$10 00	$40 00	$205 00	$60 00	$40 00	–	–	$273 00	$15 00	$56 00	$6 00
Middlesex,	–	–	44 00	–	–	–	$28 75	139 25	–	43 00	–
Middlesex South,	–	–	141 00	–	–	–	–	48 50	–	13 00	–
Middlesex North,	26 30*	–	–	48 50	–	–	–	59 00	–	11 00	–
Worcester,	–	–	74 00	–	–	–	–	–	–	61 00	–
Worcester West,	–	–	58 00	5 00	3 50	–	3 00	12 50	–	49 00	–
Worcester North,	5 00	–	63 00	46 00	46 00	–	18 89	46 75	–	12 00	–
Worcester South,	–	–	–	–	–	–	–	15 75	–	18 00	–
Hampshire, Franklin and Hampden,	3 00	12 00	54 00	20 00	11 00	–	10 00	20 00	–	19 00	–
Hampshire,	3 00	–	49 00	33 00	34 50	$7 00	–	22 59	–	25 40	–
Hampden,	–	–	144 00	55 00	42 50	–	–	44 50	–	24 00	–
Hampden East,	–	–	–	–	–	–	3 00	4 00	–	14 00	3 37
Franklin,	2 00	–	73 00	47 00	47 00	9 00	–	–	–	11 25	–
Berkshire,	6 00	6 00	216 00	202 00	202 00	–	–	43 00	–	42 00	–
Housatonic,	13 00	–	192 00	192 00	192 00	1 00	22 00	43 00	–	44 00	9 00
Norfolk,	–	–	100 00	16 00	65 00	–	–	95 00	–	18 00	–
Plymouth,	–	15 00	246 00	164 00	97 00	–	–	81 00	–	50 00	10 00
Bristol,	–	–	232 00	43 00	43 00	–	26 50	106 00	–	21 00	9 50
Barnstable,	25	–	68 00	32 25	–	–	4 25	20 00	–	4 00	–
Nantucket,	5 00	–	53 00	53 50	43 75	–	–	17 50	–	7 00	–
Totals,	$53 55	$73 00	$2,012 00	$1,020 25	$857 25	$17 00	$116 39	$1,091 34	$15 00	$542 65	$37 87

*Including Grass Crops, Potatoes, Carrots, Beets and Turnips.

MISCELLANEOUS.

SOCIETIES.	Amount awarded for agricultural implements.	Amount awarded for all other agricultural objects.	Amount awarded for objects other than agricultural.	Number of persons who received premiums and gratuities for agricultural objects.
Essex,	$23 00	$1,115 28	$244 75	210
Middlesex,	10 00	–	40 00	173
Middlesex South,	13 00	–	70 10	105
Middlesex North,	10 00	17 00	31 13	92
Worcester,	17 00	–	–	92
Worcester West,	9 00	30 00	61 92	80
Worcester North,	8 50	506 14	74 15	110
Worcester South,	–	–	25 66	52
Hampshire, Franklin and Hampden,	16 00	20 00	115 00	161
Hampshire,	10 00	28 55	31 80	222
Hampden,	18 00	6 50	331 50	118
Hampden East,	5 00	–	33 00	135
Franklin,	21 00	29 00	30 00	200
Berkshire,	28 00	32 00	97 00	275
Housatonic,*	20 00	767 00	106 00	202
Norfolk,	–	591 25	69 25	100
Plymouth,	5 00	25 00	326 25	419
Bristol,	–	10 00	137 00	163
Barnstable,	1 00	–	58 36	117
Nantucket,	–	–	35 50	21
Totals,	$214 50	$3,177 72	$1,918 37	3,047

*Female Equestrianship, $20.

Names of Towns and Cities in which Premiums and Gratuities for Agricultural objects were distributed by each Society, and the amount to each town.

ESSEX.

Amesbury,	$43 00	Methuen,	$4 68
Andover,	19 00	Newbury,	130 00
Boxford,	19 00	North Andover,	65 00
Bradford,	36 00	Rowley,	36 66
Danvers,	58 00	Salem,	48 00
Essex,	17 00	Salisbury,	15 00
Georgetown,	61 00	South Danvers,	17 00
Groveland,	7 50	Topsfield,	22 50
Haverhill,	12 70	Wenham,	4 00
Ipswich,	29 00	West Newbury,	116 24
Lawrence,	18 00	Newburyport,	240 00
Lynnfield,	3 00		
Marblehead,	43 00	Total,	$1,065 28

MIDDLESEX.

Acton,	$31 00	Concord,	$186 75
Bedford,	33 25	Dracut,	10 50
Brighton,	27 00	Framingham,	61 50
Cambridge,	18 00	Groton,	2 00
Carlisle,	12 00	Lexington,	13 75
Chelmsford,	13 75	Lincoln,	38 50

MIDDLESEX—CONTINUED.

Littleton,	$5 00	Sudbury,	$17 00
Lowell,	10 00	Tewksbury,	5 00
Marlborough,	24 00	Waltham,	23 50
North Reading,	25 00	Watertown,	4 50
Pepperell,	18 00	Wayland,	30 00
Sherborn,	25 00	Weston,	1 00
Shirley,	25 50	Wilmington,	81 00
Somerville,	2 00	Woburn,	4 00
South Reading,	26 00	Total,	$780 50
Stowe,	6 00		

MIDDLESEX SOUTH.

Ashland,	$7 00	Newton,	$7 00
Framingham,	212 00	Sherborn,	27 50
Holliston,	20 00	Southborough,	49 00
Hopkinton,	33 00	Sudbury,	30 50
Marlborough,	39 00	Wayland,	39 50
Milford,	3 00	Total,	$505 00
Natick,	37 50		

MIDDLESEX NORTH.*

Billerica,	$5 00	Tewksbury,	$35 75
Chelmsford,	93 25	Tyngsborough,	11 00
Dracut,	35 00	Westford,	35 75
Dunstable,	44 00	Wilmington,	32 00
Lowell,	169 25	Total,	$161 00

*Fancy work, $31.13.

WORCESTER.

Auburn,	$2 00	Oakham,	$8 00
Barre,	48 00	Oxford,	29 00
Berlin,	17 00	Paxton,	4 00
Bolton,	5 00	Phillipston,	4 00
Boylston,	28 00	Princeton,	120 00
Charlton,	22 00	Shrewsbury,	16 00
Grafton,	33 00	Southborough,	11 00
Hardwick,	7 00	Southbridge,	10 00
Holden,	14 00	Sutton,	47 00
Leicester,	9 00	Upton,	3 00
Millbury,	6 00	Westborough,	14 00
New Braintree,	17 00	West Boylston,	18 00
Northborough,	20 00	Worcester,	206 00
North Brookfield,	7 00	Total,	$725 00

WORCESTER WEST.

Athol,	$0 50	Oakham,	$4 00
Barre,	226 00	Paxton,	4 00
Bernardston,	20 00	Petersham,	18 00
Dana,	4 00	Pittsfield,	6 00
Hardwick,	48 00	Princeton,	49 00
New Braintree,	36 00	Warren,	2 00
North Brookfield,	6 00	Total,	$123 00

WORCESTER NORTH.

Ashburnham,	$15 25	Fitchburg,	$164 93
Ashby,	6 75	Leominster,	8 50

WORCESTER NORTH—CONTINUED.

Lunenburg,	$4 00	Sterling,	$33 65
Phillipston,	3 00	Townsend,	4 00
Princeton,	183 50	Westminster,	48 48
Shirley,	15 00	Total,	$187 06

WORCESTER SOUTH.

Brimfield,	$11 00	Southbridge,	$36 00
Brookfield,	16 75	Spencer,	5 00
Charlton,	37 50	Sturbridge,	91 00
Dudley,	18 50	Warren,	6 00
Holland,	13 00	West Brookfield,	6 00
North Brookfield,	4 00	Total,	$244 75

HAMPSHIRE, FRANKLIN AND HAMPDEN.

Amherst,	$2 00	Northampton,	$203 00
Chicopee,	1 00	Shelburne,	10 00
Conway,	18 00	South Hadley,	105 00
Easthampton,	26 00	Southampton,	21 00
Goshen,	7 00	Springfield,	13 00
Granby,	17 00	Sunderland,	28 00
Hadley,	73 00	Westfield,	89 00
Hatfield,	21 00	Westhampton,	5 00
Holyoke,	2 00	Whately,	20 00
Huntington,	9 00	Williamsburg,	9 00
Middlefield,	14 00	Worthington,	20 00
New Salem,	3 00	Total,	$716 00

HAMPSHIRE.

Amherst,	$117 45	Northampton,	$7 00
Belchertown,	17 95	Pelham,	2 75
Boston,	25	Petersham,	1 00
Chicopee,	2 00	Shelburne,	1 75
Conway,	5 62	Shutesbury,	10 00
Enfield,	75	South Hadley,	5 75
Granby,	18 70	Springfield,	3 25
Greenfield,	25	Sunderland,	143 42
Hadley,	70 93	Ware,	2 87
Heath,	2 00	Whately,	6 75
Leverett,	27 85	Williamsburg,	3 25
Middleborough,	50	Windsor,	1 00
Montague,	87	Total,	$453 91

HAMPDEN.

Agawam,	$15 75	Southwick,	$4 25
Chicopee,	60 00	Springfield,	203 00
Holyoke,	26 00	Westfield,	78 00
Ludlow,	12 00	West Springfield,	42 50
Longmeadow,	57 00	Wilbraham,	92 00
Russell,	5 00	Total,	$595 50

HAMPDEN EAST.

Belchertown,	$17 50	Ware,	$5 00
Holland,	8 00	Warren,	6 50
Monson,	52 37	Wilbraham,	48 00
Palmer,	75 32	To towns not named,	35 00
Russell,	4 00		
Springfield,	5 00	Total,	$256 69

FRANKLIN.

Ashfield,	$5 00	Leverett,	$1 00
Bernardston,	4 00	Leyden,	5 00
Buckland,	4 00	Montague,	13 00
Coleraine,	10 00	New Salem,	6 00
Conway,	12 00	Northfield,	3 00
Deerfield,	31 00	Orange,	5 00
Gill,	3 00	Shelburne,	19 00
Greenfield,	49 00	Sunderland,	21 00
Heath,	4 00	Total,	$198 00

BERKSHIRE.

Adams,	$38 00	New Ashford,	$1 00
Becket,	4 50	New Marlborough,	1 00
Cheshire,	36 50	Pittsfield,	344 00
Dalton,	68 00	Richmond,	39 00
Egremont,	59 50	Sheffield,	39 00
Great Barrington,	65 50	Stockbridge,	118 00
Hancock,	2 00	Tyringham,	3 00
Hinsdale,	20 00	West Stockbridge,	4 00
Lanesborough,	122 50	Williamstown,	19 00
Lee,	13 50	Windsor,	12 00
Lenox,	74 50	Total,	$1,093 00
Monterey,	8 50		

HOUSATONIC.

Alford,	$9 00	Great Barrington,	$366 00
Becket,	3 00	Lee,	17 00
Egremont,	133 00	Lenox,	26 50

HOUSATONIC — Continued.

Monterey,	$60 00	Sheffield,	$159 00
New Marlborough,	17 00	Stockbridge,	52 50
Pittsfield,	6 50	Tyringham,	2 00
Richmond,	18 00	West Stockbridge,	6 50
Salisbury,	1 00	Total,	$909 00
Sandisfield,	32 00		

NORFOLK.

Bellingham,	$20 00	Medway,	$3 50
Braintree,	45 00	Needham,	68 50
Brookline,	16 00	Quincy,	7 00
Cambridge,	10 00	Randolph,	8 00
Canton,	20 00	Roxbury,	61 00
Dedham,	117 75	Sharon,	2 00
Dorchester,	49 00	Stoughton,	3 50
Dover,	26 00	Walpole,	21 50
Foxborough,	18 00	Weymouth,	10 00
Franklin,	30 00	West Roxbury,	50 00
Medfield,	33 25	Wrentham,	15 50
Milton,	25 00	Total,	$660 50

PLYMOUTH.

Abington,	$92 00	Halifax,	$21 02
Bridgewater,	429 26	Hanson,	8 00
Carver,	37 40	Hingham,	4 00
Duxbury,	2 25	Lakeville,	19 25
East Bridgewater,	162 96	Marshfield,	50

PLYMOUTH—CONTINUED.

Middleborough,	$124 69	South Scituate,	$3 00
North Bridgewater,	173 02	Wareham,	25
Pembroke,	10 75	West Bridgewater,	117 32
Plymouth,	8 36	Towns not named,	1 76
Plympton,	31 00	Total,	$1,258 29
Rochester,	11 50		

BRISTOL.

Attleborough,	$10 00	Pawtucket,	$1 50
Berkley,	12 00	Raynham,	96 00
Dartmouth,	7 50	Rehoboth,	12 00
Easton,	16 00	Seekonk,	10 50
Fairhaven,	13 00	Somerset,	99 00
Fall River,	201 50	Swanzey,	11 00
Freetown,	2 00	Taunton,	75 00
Mansfield,	12 00	Westport,	44 00
New Bedford,	22 50	Total,	$689 50
Norton,	44 00		

BARNSTABLE.

Barnstable,	$203 24	Provincetown,	$0 25
Brewster,	12 00	Sandwich,	46 37
Chatham,	15 00	Yarmouth,	5 50
Falmouth,	3 00	Total,	$291 36
Harwich,	6 00		

NANTUCKET.

Nantucket,	$273 75

[A.]

Inventory of Stock, Crops, Tools, &c., at the State Farm at Westborough, December 1, 1855.

5 Yoke Oxen,		$845 00	
20 Cows,		715 00	
1 Jersey Cow, Alice,	$150 00		
1 Hereford Cow,	175 00		
1 Hereford Heifer,	130 00		
2 Jersey Bulls,	100 00		
		555 00	
3 Horses — Billy, $170; Charlie, $190; Cate, $130,		490 00	
2 Breeding Sows and 18 Pigs,		67 00	
16 Shotes, at $12,		192 00	
13 Fattening Hogs,		325 00	
2 Boars,		35 00	
8 Young Breeding Sows,		100 00	
72 Tons English Hay on hand, at $18,		1,296 00	
27 " Meadow Hay on hand, at $9,		243 00	
5 " Straw on hand at $10,		50 00	
30 " Corn Fodder on hand, at $6,		180 00	
982 Bushels Indian Corn on hand,		1,145 67	
380 " Oats on hand,		190 00	
120 " Rye on hand,		160 00	
48 Tons Carrots on hand,		576 00	
350 Cabbages,		10 50	
854 Bushels Ruta Bagas,		170 80	
208 " Beets,		52 00	
140 " English Turnips,		140 00	
42 " Parsnips,		14 00	
100 " Onions,		67 00	
140 " Potatoes,		70 00	
3 Hay Cutters,		37 50	
1 Feed Trough,		4 00	
13 Hay Forks,		4 00	
32 Hay Rakes,		4 00	
25 Manure Forks,		20 00	
100 Shovels,		40 00	
13 Spades,		13 00	
30 Picks,		30 00	
2 Manure Hooks,		1 00	
15 Iron Bars,		15 00	
4 Stone Frames,		6 00	
1 Ox Wagon,		40 00	
1 Horse Wagon,		40 00	
1 " "		30 00	
1 " "		30 00	
2 Horse Carts,		40 00	
3 Ox Carts,		70 00	
1 Stone Elevator,		160 00	
4 Stone Drags,		5 00	
8 Ploughs,		32 00	
3 Harrows,		13 00	
2 Cultivators,		10 00	
2 Hand Cultivators,		4 00	
8 Ox Yokes,		$16 00	
11 Ox Chains,		15 00	
4 Stake Chains,		2 00	
2 Ox Sleds,		7 00	
2 Horse Sleds,		12 00	
1 Buggy,		5 00	
1 Sleigh,		25 00	
Harnesses,		50 00	
Stable Utensils, &c.,		15 00	
Articles in Tool Room,		10 00	
1 Iron Roller,		20 00	
Tanning Mill and Corn Sheller,		10 00	
1 Seed Sower,		5 00	
Steel Yards and Balances,		20 00	
50 Strawberry Boxes,		1 50	
49 Hand Hoes,		16 00	
8 Drills,		8 00	
16 Wheelbarrows,		40 00	
Beetle and Wedges,		2 00	
Measures and Grass Shears,		2 00	
9 Iron Rakes,		3 00	
4 Water Cans,		2 00	
3 Bog Hooks,		4 00	
6 Axes,		3 00	
5 Wood Saws,		5 00	
3 Ice Hooks,		1 00	
Ice Tongs,		2 00	
2 Cross-cut Saws,		5 00	
2 Hand Saws,		1 00	
20 Baskets,		8 00	
4 Scythes,		2 00	
12 Snaths,		6 00	
Grindstone,		5 00	
6 Bush Scythes,		4 00	
8 Pails,		1 00	
Spirit Level,		2 00	
1 Scraper,		6 00	
1 Swill Cart,		40 00	
Refrigerator,		10 00	
Lumber, clear,		80 00	
Lumber, common,		10 00	
Surveyor's Chain,		2 00	
14 Corn Cutters,		2 00	
2 Derricks,		50 00	
Garden Reel,		1 00	
Phosphates,		6 00	
4 Bushels Seed Beans,		8 00	
16 Meal Bags,		4 00	
Household Furniture,		137 15	
Total,		$9,028 62	

[B.]

Inventory of Stock, Crops, Tools, &c., at the State Farm at Westborough, December 1, 1856.

3 Yoke Oxen, $180,	$540 00
21 Cows, $40,	840 00
1 Hereford Cow,	200 00
1 Hereford Heifer,	175 00
1 Hereford Bull Calf,	300 00
1 Horse, Charlie,	150 00
1 Horse, Braley,	160 00
1 Mare, Kate,	130 00
1 Horse, Billy,	150 00
1 Jersey Cow, Alice,	150 00
1 Jersey Bull,	150 00
1 Jersey Heifer Calf,	25 00
1 Devon Cow,	100 00
1 Devon Calf,	25 00
1 Bull,	35 00
6 Fat Hogs,	160 00
8 Breeding Sows,	144 00
52 Shotes,	359 00
18 Sucking Pigs,	54 00
1 Boar, Suffolk,	25 00
68 Tons English Hay,	1,020 00
9 Tons Rowen,	90 00
1 Ton of Meadow Rowen,	7 00
22 Tons Meadow Hay,	176 00
1½ Tons Bromus,	10 00
1 Ton Millet,	10 00
40 Tons Corn Fodder, principally Husks and Stalks,	320 00
4 Tons Rye Straw,	40 00
1470 Bushels Indian Corn,	1,470 00
659 Bushels Ruta Bagas,	131 80
47 Tons Carrots,	470 00
176 Bushels Seed Potatoes,	132 00
60 " Small Potatoes,	12 00
40 " Oats,	20 00
50 " Rye,	50 00
100 " Beets,	25 00
4 Hay Cutters,	50 00
1 Feed Trough,	4 00
10 Hay Forks,	3 00
12 Hay Rakes,	3 00
22 Manure Forks,	17 00
40 Shovels,	20 00
18 Spades,	14 00
30 Picks,	22 00
2 Manure Rakes,	1 00
10 Iron Bars,	10 00
3 Stone Hammers,	5 00
1 Ox Wagon,	40 00
1 Two-Horse Wagon,	20 00
1 One-Horse Wagon,	30 00
3 Ox Carts,	70 00
4 Horse Carts,	160 00
3 Stone Drags,	4 00
10 Plough,	100 00
4 Harrows,	24 00
1 Cultivator,	3 00
1 Horse Hoe,	$5 00
2 Horse Harrows,	4 00
2 Hand Cultivators,	2 00
1 Job Wagon,	15 00
5 Ox Yokes,	8 00
10 Draft Chains,	12 00
1 Derrick Chain,	7 00
4 Stake Chains,	3 00
4 Trace Chains,	3 00
2 Ox Sleds,	10 00
2 Horse Sleds,	16 00
1 Sleigh,	20 00
Old Harnesses,	40 00
Stable Furniture, Buffalo, &c.,	10 00
Articles in Scale Room,	5 00
Iron Roller,	20 00
Fanning Mill and Corn Sheller,	12 00
Stone Elevator,	175 00
15 Bushels Seed Corn,	22 00
2 Bushels Seed Beans,	4 00
1 Seed Sower,	3 00
1 pair Steelyards,	2 00
1 Platform Scale,	7 00
1500 Pounds Guano,	45 00
800 Pounds Super-phosphate of Lime,	24 00
25 Strawberry Boxes,	1 00
30 Hoes,	8 00
10 Hand Drills,	6 00
2 Hand Hammers,	3 00
20 Wheelbarrows,	30 00
1 Beetle, with Wedges,	2 00
2 Grindstones,	10 00
4 Water Cans,	2 00
6 Bog Hoes,	2 00
4 Axes,	3 00
4 Wood Saws,	4 00
4 Ice Hooks,	1 00
1 Pair Ice Tongs,	2 00
2 Cross-cut Saws,	6 00
2 Hand Saws,	2 00
3 Scythes and Snaths,	3 00
12 Grain Bags,	2 00
12 One-Bushel Baskets,	5 00
10 Milk Cans,	6 00
Lot first quality Lumber,	50 00
3 Buckets,	75
Surveyor's Chain,	2 00
1 Ox Shovel,	6 25
1 Spirit Level,	2 00
1 Swill Cart,	42 00
1 Refrigerator,	11 00
1 Derrick,	50 00
Household Furniture,	206 41
1 Garden Reel,	1 00
24 Corn Cutters,	4 00
Total,	$9,402 41

Cash Account of the Treasurer.

1855-6.			1855-6.		
Dec. 1,	To cash on hand,	$146 03	Nov. 30,	By cash paid for labor,	$2,953 05
June 13,	" " received from the State Treasurer,	3,000 00	"	" " " for live stock,	834 65
June 23,	" " " from the Treasurer of State Reform School,	1,700 00	"	" " " for farm expenses,	943 06
Nov. 30,	" " " from the Treasurer of State Reform School,	1,204 70	"	" " " for fertilizers,	644 40
Nov. 30,	" " " from sales by S. N. White,	1,160 26	"	" " " for rent on land,	237 04
			"	" " " for repairs,	341 53
			"	" " " for implements,	407 86
			"	" " " for transportation,	98 69
			"	" " " for furniture,	69 28
			"	" " " for permanent improvements,	245 70
			"	" " " for settlement,	48 86
			"	" " " for contingent expenses,	81 71
			"	" " " for sundries,	247 41
			"	" " on hand,	57 75
		$7,210 99			$7,210 99

I have examined the foregoing account, and find it correctly cast, and properly vouched.

JOHN BROOKS,
Chairman of Auditing Committee.

Boston, Dec. 10, 1856.

Dr. BOARD OF AGRICULTURE *in account with the* COMMONWEALTH. *Cr.*

To personal estate inventory of 1855,	$9,028 62	By personal estate inventory of 1856,	$9,402 41
" cash on hand,	146 03	" labor,	3,319 77
" cash received of the State Treasurer,	3,000 00	" farm,	943 06
" " " of the Treasurer of State Reform School,	2,904 70	" live stock,	834 65
" " " of the Treasurer of State Reform School, for corn,	490 80	" fertilizers,	644 40
" " " of the Treasurer of State Reform School, for rye,	105 00	" rent on land,	237 04
" " " of the Treasurer of State Reform School, for milk,	1,128 47	" repairs,	341 53
" " " of the Treasurer of State Reform School, for pork,	394 80	" implements,	407 86
" " " of the Treasurer of State Reform School, for beef,	460 63	" transportation,	98 69
" " " of the Treasurer of State Reform School, for straw,	3 50	" furniture,	69 28
" " " of the Treasurer of State Reform School, for wood,	22 00	" stationery,	8 52
" " " of the Treas. of State Reform School, for garden vegetables,	108 50	" permanent improvements,	2,190 54
" " " of the Treasurer of State Reform School, for beans,	54 00	" balance on settlement with State Reform School,	48 86
" " " of the Treasurer of State Reform School, for fruits,	230 46	" contingent expenses,	81 71
" " " of the Treasurer of State Reform School, for potatoes,	680 25	" boys' labor, paid,	793 60
" " " of the Treasurer of State Reform School, for hay,	75 00	" swill,	350 00
" " " of the Treasurer of State Reform School, for plaster,	40	" board of man, 4 months,	52 29
" " " of the Treasurer of State Reform School, for pasturing,	3 15	" farm produce to laborers,	429 51
" " " of the Treasurer of State Reform School, for labor,	314 90	" cash on hand,	57 75
" " " from farm sales, by S. N. White,	1,160 26		$20,311 47
	$20,311 47		

INDEX OF SYSTEMATIC NAMES.

Page.

Agrostis stolonifera, . . . 28, 30, 120
" perennans, ... 29
" vulgaris, . . 13, 26, 119, 124
" alba, ... 28, 30, 119
" canina, ... 28
" scabra, ... 29
" dispar, ... 30
Andropogon furcatus, ... 88
" scoparius, ... 89
" nutans, ... 89
Anthoxanthum odoratum, . . . 79, 124
Aira flexuosa, ... 71, 72
" cæpitosa, ... 71, 118
" aquatica, ... 72
Alopecurus pratensis, . 16, 20, 76, 119, 124
" agrestis, . . . 16, 22, 120
" geniculatus, . . 16, 22, 23, 118
" aristulatus, . . . 16, 23
Ammophila arundinacea, . 16, 33, 119, 164
Avena pratensis, ... 74, 118
" flavescens, ... 74
Aristida dichotoma, ... 38
" gracilis, ... 38
Arrhenatherum avenaceum, . . 74, 119
Briza media, ... 54, 55
" maxima, ... 54
Brizopyrum spicatum, ... 43
Bromus secalinus, . . 59, 61, 120, 268
" racemosus, ... 60, 63
" mollis, . . . 60, 63, 120, 124
" Kalmii, ... 64
" ciliatus, ... 64
" pratensis, ... 64
Calamagrostis Canadensis, . . . 16, 33
" coarctata, . . . 16, 33
Cinna arundinacea, ... 31
Cynosurus cristatus, . . . 58, 59, 124
Cyperaceæ, ... 113
Cenchrus tribuloides, ... 88
Danthonia spicata, ... 73
Dactylis glomerata, . 13, 39, 66, 118, 119, 124
Eatonia Pennsylvanica, ... 41

Page.

Elymus, arenarius, ... 16, 70
" Virginicus, ... 70
" Canadensis, ... 70
" striatus, ... 70
Eragrostis reptans, ... 53
" poæoides, ... 54
" megastachya, ... 54
" pilosa, ... 54
" capillaris, ... 54
" pectinacea, ... 54
Festuca tenella, ... 54
" ovina, ... 55, 56, 118
" pratensis, ... 55, 56, 119
" elatior, ... 57, 118
" duriuscula, ... 58, 118
" rubra, ... 58
" loliacea, ... 58
" nutans, ... 58
Glyceria Canadensis, ... 42
" obtusa, ... 42
" distans, ... 43
" elongata, ... 42
" nervata, ... 42
" pallida, ... 43
" acutiflora, ... 43
Gymnostichum Hystrix, ... 71
Hedysarum onobrychis, . . . 108, 125
Hierochloa borealis, ... 78
Holcus lanatus, ... 77, 119, 124
Holcus mollis, ... 77
Hordeum jubatum, ... 70
" distichum, ... 70
" vulgare, ... 70
Juncagineæ, ... 109
Juncaceæ, ... 110
Leersia oryzoides, . . . 16, 19, 118
" Virginica, ... 16, 20
Lolium perenne, ... 64, 67, 119
" Italicum, ... 64, 67, 119
" temulentum, ... 64, 68
" multiflorum, ... 67, 68
Medicago sativa, ... 104, 125

	Page.
Millium effusum,	84
Muhlenbergia diffusa,	16, 31
" erecta,	16, 31
" glomerata,	16, 31
" Mexicana,	16, 32
" sylvatica,	16, 32
" sobolifera,	16, 32
" Willdenovii,	16, 32
" capillaris,	16, 32
Moha de Hongrie,	86
Oryzopsis melanocarpa,	16, 38
" asferifolia,	38
" Canadensis,	38
Panicum filiforme,	18, 84
" glabrum,	19, 85
" sanguinale,	19, 85
" agrostoides,	19, 85
" proliferum,	19, 85
" capillare,	19, 85
" virgatum,	19, 85
" latifolium,	19, 86
" clandestinum,	19, 86
" xanthophysum,	19, 86
" crus-galli,	86
" germanicum,	86, 87
Paspalum setaceum,	84
Phalaris arundinacea,	62, 80, 81, 118, 268
" Canariensis,	84
Phleum pratense,	13, 16, 23, 24, 25, 26, 119, 124, 126, 129
Phragmites communis,	64, 118
Poa nervata,	17, 42
" serotina,	17, 42, 52, 161
" pratensis,	17, 43, 44, 47, 119
" maritima,	17, 43, 49, 110, 119
Poa compressa,	17, 46, 120
" annua	13, 17, 47, 120
" trivialis,	17, 47, 48, 120
" nemoralis,	17, 48, 49
" fluitans,	50, 118
" laxa,	17, 51
" aquatica,	51, 118
Polypogon monspeliensis,	16, 31
Setaria verticillata,	87
" glauca,	87
Setaria viridis,	88
Setaria Italica,	88
Sorghum saccharatum,	89
" nutans,	98
" vulgare,	98
Spartina cynosuroides,	38
" polystachya,	38, 119
" juncea,	38, 119
" stricta,	38, 119
Sporobolus serotinus,	26
Stipa avenacea,	38
Tricuspis purpurea,	39
Trifolium pratense,	100, 125
" repens,	104, 125
Trisetum mollis,	74
" pubescens,	74
Triticum repens,	68, 69, 120
Tripsacum dactyloides,	88
Vilfa aspera,	25
" vaginæflora,	25
" serotina,	26
Xyris bulbosa,	112
" caroliniana,	112
Zea mays,	99
Zizania aquatica,	20, 118

GENERAL INDEX.

Aftermath, growth of, ... 25, 121, 209, 211
Agricultural Museum, ... 5, 6, 239
Agricultural Reports, demand for, ... 5, 283
Agricultural Societies, prosperity of, ... 283
Agriculture, Board of, ... 3, 7, 8, 239, 241, 281, 283
Alfalfa, ... 104, 105, 107
Allen's Mower, ... 178, 182, 183
Ammonia, importance of, ... 225, 226, 231
Analysis of the Grasses, ... 82, 126, 129, 132
Annual Spear Grass, . . . 11, 13, 43, 47, 120, 124, 126, 129
Appropriations for the State Farm, . . 8, 241, 262, 265, 276
Arrow Grasses, list of, ... 109
Ash of the Grasses, analysis of, ... 132
Ashes, use of, as manure, ... 222, 224, 318

Barn Grass, ... 86
Beach Grass, ... 33, 34, 36, 119, 154, 166
" " culture of, ... 34, 36, 37
Bearded Darnel, ... 68
Berkshire Society, report on, ... 305
Black Grass, ... 110, 119
Blue Grass, ... 46, 120
Blue-joint Grass, ... 33
Bones, value of, as manure, ... 227
Borden's Grass, ... 26, 27
Bristol Society, report on, ... 311

Canadian Lyme Grass, ... 70
Chandler Grass, ... 68, 69
Chess, ... 59, 61, 120
Chinese Sugar Cane, ... 89, 91, 93, 98, 276
Circular Letter, ... 136
Climate—its effect on vegetation, . . . 138, 139, 140, 144
Clover Seed, time of sowing, ... 147

Clover, mode of curing, ... 194, 196
Common Reed Grass, ... 64, 118
Common Manna Grass, ... 50, 118
Common Canary Grass, ... 84
Common Spear Grass, ... 43, 45, 46
Compost, modes of forming, ... 228, 229, 231
Corn Fodder, curing of, ... 197, 198
Couch Grass, ... 68, 69, 120
Cows, experiments in feeding, ... 242, 244, 261
Crested Dog's Tail, ... 58, 59, 124, 126, 129, 154
Crops at the State Farm, report on, ... 264, 276
Curing, methods of, ... 193, 195

Darnel, ... 64
Drainage, importance of, ... 212, 233
Dew Grass, ... 26, 28
Downy Oat Grass, ... 73, 74, 119

English Bent, ... 28
Essex Agricultural Society, report on, ... 287, 289

Fall Feeding, practice of, ... 209, 211
Fall Seeding, ... 145, 147, 148
False Redtop, ... 52
Feather Grass, ... 38
Fertilizers at the State Farm, report on, ... 266
Field Barley Grass, ... 119
Floating Meadow Grass, ... 50
Floating Foxtail, ... 22, 23, 118
Flyaway Grass, ... 29
Finger-spiked Wood Grass, ... 88
Finger Grass, ... 85
Fiorin, ... 28, 30
Food of Animals, ... 9, 121, 122
Forest Trees, culture of, ... 216, 217, 232
Fowl Meadow Grass, ... 52
Franklin Society, report on, ... 303, 305
Fresh Water Cord Grass, ... 38
Fringed Brome Grass, ... 64
Finetop, ... 26

Gama Grass, ... 88
Goose Grass, ... 49, 50, 110, 111, 119
Grasses, growth in sun and shade, . . . 139, 143, 145, 136
" effect of soil and seasons on, . . . 10, 121, 136, 138
" nutritive value of the, . 120, 121, 126, 127, 129, 130, 169, 134
" mixtures of, . . . 126, 150, 152, 155, 159, 166, 168
" list of the, ... 16, 118, 119, 124

Grasses, importance of the, ... 9, 14, 120
" classification of, ... 10, 12, 15, 16, 118, 121
" description or natural history of, . 10, 13, 15, 19 to 120
" technical terms applied to the, . . . 10, 13, 14, 15
" flowers of the, ... 11, 13, 15
" time of cutting, ... 169, 170, 172, 174
" analysis of the, ... 62, 126, 128, 129, 130
" time of sowing, ... 145
Grass Lands, treatment of 212, 215, 216, 232
" " top-dressing of, ... 218
" " drainage of, ... 212
Grass Seed, mode of buying, ... 149, 153
" " weight of, ... 153, 154, 156, 167
" " germination of, . . . 14, 139, 150, 154, 155
" " time of sowing, ... 145, 148
" " selection of, ... 149, 150
" " depth of covering, ... 154
Green Meadow Grass, ... 43, 45, 46
Guano as a top-dressing, ... 213, 230, 267, 269, 319

Hassock Grass, ... 71, 118, 154
Hair Grass, ... 29
Hairy Meadow Grass, ... 54
Hampshire, Franklin and Hampden Society, report on, . . 298, 300
Hampshire Society, report on, ... 301, 303
Hay, nutritive value of, ... 111, 112, 117, 134, 135
" curing of, ... 189, 191
Hay Caps, use of, ... 204, 207
" " permanent, ... 208, 209
Hard Fescue Grass, ... 58, 118, 124, 126, 129, 154
Heath's Mower, ... 183, 184, 185
Hoove in Cattle, ... 109, 112
Horses, trials of, ... 277, 280, 281, 295
Horserake, use of, ... 199, 201, 203
Housatonic Society, report on, ... 306, 308
Hungarian Millet, ... 86, 88

Improvements, report of Committee on, ... 262
Indian Corn, ... 14, 99, 100, 123, 197, 198
Indian Millet, ... 98
Indian Grass, ... 98
Irrigation, effect of, ... 126, 129, 131, 234
Italian Rye Grass, . . . 66, 67, 68, 119, 126, 129, 131, 154

June Grass, ... 43, 45, 46, 126, 129, 154

Kentucky Blue Grass, ... 43, 45, 46
Ketchum's Mower, ... 179, 181

Labor, report of Committee on, ... 239, 241
Lawn Grasses, mixture of, ... 161, 162
Lucerne, culture of, ... 104, 105, 107, 154
" nutritive value of, ... 128, 130
Lyme Grass, ... 70

Manny's Mower, ... 176, 177, 183
Manures for Grass Lands, . . 213, 218, 222, 227, 230, 267, 269
" experiments with, . . . 269, 270, 272, 273, 275
Meadow Fescue Grass, ... 55, 56, 119, 154
Meadow Brome Grass, ... 64, 65
Meadow or Swale Hay, ... 111, 112, 117
Meadow Spear Grass, ... 42, 126, 129
Meadow Soft Grass, ... 76, 77, 119, 126, 129, 154
Meadow Oat Grass, ... 74, 118
Meadow Foxtail, ... 20, 21, 25, 76, 119, 124, 126, 129
Middlesex Society, report on, ... 289, 291
Middlesex North Society, report on, ... 291, 293
Millet Grass, ... 84, 154
Mixtures of Grass Seed, . . . 150, 152, 159, 161, 166, 168
Mowing, height of, ... 187, 189
Mowing Machines, use of, ... 175
" " premiums for, ... 175

Nitrogen, importance of, in food, ... 122, 123
Nutritive Value of Grasses, . 120, 122, 126, 127, 128, 129, 134, 171
Nutritive Equivalents, tables of, ... 133, 135
Nerved Manna Grass, ... 42
Nitrogen, value of, in plants, ... 122
Norfolk Society, report on, ... 309

Oil Cake, effect of, as food, ... 123
Orchard Grass, . . . 13, 39, 40, 66, 118, 119, 124, 126, 129, 154
Over-seeding with few species, ... 167

Pasture Grasses, ... 156, 159, 160, 174
Pastures, turf of old, ... 156, 157
" renovation of, ... 213, 217, 218, 232
Perennial Rye Grass, ... 64, 65, 118, 154
Plaster of Paris, use of, ... 224, 225, 227
Plymouth Society, report on, ... 312
Potatoes, experiments with, ... 229, 273, 274
Poudrette, experiments with, ... 273

Quaking Grass, ... 54, 55, 126, 129

Rattlesnake Grass, ... 42
Redtop, ... 13, 26, 119, 124, 126, 129, 154, 156

Red Clover, . . . 100, 101, 103, 127, 128, 130, 154, 156
" " curing of, ... 194, 196
Reed Canary Grass, ... 80, 81, 82, 84, 118
" " " nutritive value of, ... 62
Red Fescue Grass, ... 57, 58, 154
Rhode Island Bent, ... 27
Rice Grass, ... 19, 118
Roots of Timothy Grass, ... 172, 173, 174
Rough Stalked Meadow Grass, . . . 47, 48, 120, 126, 129
Rush-like Grasses, list of, ... 109, 110
Rush Salt Grass, ... 38, 119

Salt Marshes, ditching of, ... 112
Salt Marsh Grass, ... 38, 118
Salt Reed Grass, ... 38, 119
Sainfoin, ... 108, 128, 130, 154
Sea Spear Grass, ... 49, 50, 110, 111
Seasons, influence of, ... 136, 138, 140, 145
Sedges, list of, ... 113
Seed, selection of, ... 149, 150
Shade—its effect on the quality of grass, . . . 136, 143, 144
Sheeps' Fescue Grass, ... 55, 56, 118, 154
Slender Spiked Fescue, ... 58, 59, 154
Slender Hairy Lyme Grass, ... 70
Soil—its effect on the grasses, ... 10, 27, 121, 152
Soils, mixture of, ... 219, 231
Soft Brome Grass, ... 120
Speed, trials of, ... 277, 281, 295
Specimens of grasses, ... 236, 239
Stable Manure, experiments with, . . . 269, 271, 273, 275
Star Grasses, list of, ... 112
Starch, transformation into woody fibre, . . . 171, 187
State Farm, management of the, . . 6, 7, 8, 239, 211, 243, 262, 276
Striped Grass, ... 81
Stock, report of Committee on, ... 242, 261
" experiments with, ... 244, 261
Superficial Irrigation, effect of, ... 234, 234
Super-phosphate of Lime, experiments with, . . 271, 273, 275, 318
Stooking of Corn, practice of, ... 198
Sugar, manufacture of, ... 89, 90, 97
Swale Grass, ... 112, 113, 117, 120
Sweet-scented Vernal Grass, . . . 79, 124, 126, 129, 154
Swale Hay, value of, ... 62, 113, 170

Tall Fescue Grass, ... 57, 118, 154
Tall Oat Grass, ... 74, 76, 119, 154, 124, 126, 129
Time of cutting grass for hay, ... 169, 171, 172
Timothy, . . 13, 20, 23, 24, 25, 68, 124, 126, 129, 131, 151, 171, 172

Timothy, sown with Clover, ... 25, 152, 156
" time of cutting, ... 169, 174
Tickle Grass, ... 29
Top-dressing of grass lands, ... 218, 220, 229
Town Farms, experiments on, ... 318, 320
Treatment of grass lands, ... 212, 215, 217, 232
Trials of Speed, ... 277, 279, 281
Tufted Hair Grass, ... 71, 118, 154
Twitch Grass, ... 68, 69, 120

United States Agricultural Society, delegation to, . . . 277
Upright Sea Lyme Grass, ... 70

Vegetation, conditions of, ... 138, 139
Velvet Grass, ... 72, 154

Water Hair Grass, ... 72, 73
Water Spear Grass, ... 51, 118
Weather—its effect on vegetation, . . 10, 136, 139, 143, 144
Weeds, analysis of, ... 133
Wheat, culture of, ... 320
White Clover, ... 104, 105, 128, 130, 154
White Grass, ... 20
White Top, ... 28, 73, 119, 154
Willard's Bromus, ... 59, 120
Wire Grass, ... 46, 120
Wild Rice, ... 20, 118
Woburn Experiments, ... 121, 122
Wood Hair Grass, ... 71, 72
Wood Reed Grass, ... 31
Worcester Society, report on, ... 293, 296
Worcester South Society, report on, ... 296, 298

Yellow Oat Grass, ... 74, 126, 129, 154
Yellow-eyed Grasses, list of, ... 112

ABSTRACT OF RETURNS

OF THE

AGRICULTURAL SOCIETIES

OF

MASSACHUSETTS,

1856.

EDITED BY

CHARLES L. FLINT,

SECRETARY OF THE STATE BOARD OF AGRICULTURE.

BOSTON:

WILLIAM WHITE, PRINTER TO THE STATE.

1857.

PREFACE.

The following Abstract is eminently a book of experiments. "The publication of experiments," says Arthur Young, "really made, faithfully related, and sufficiently authenticated, is of great and important consequence to the public good. But the very reverse is the case with these books which are published under the title of General Treatises and Systems, comprehending more soils, articles of culture, &c., than any one man can experimentally have a knowledge of, consisting of the most heterogeneous parts, purloined out of former books on the same subjects without a common knowledge to discover the good from the bad. It has been said several times, and with very great justice, that what we want is a *Book of Experiments*. If any practical, intelligent husbandman, who occupied a farm, would only keep an exact register of all his business, such a collection would form, as far as it extended, a complete set of experiments. What we have are the author's reflections, instead of that which enabled him to reflect, and from which we might draw very different conclusions. *The Experiment is truth itself*; the author's conclusions, matter of opinion which we

may either agree to or reject according to our private notions."

The reader will find in these pages the results of practice for the most part, and not the deductions of theory, forming a manual of the work of the farm, on nearly all the topics which occupy the farmer's attention.

The arrangement of the volume is mainly the same as that adopted in the last Report, while the series of meteorological observations in the Appendix, and a complete index at the end, will greatly increase the value of the work.

The financial returns of the societies will be found in the Appendix to the Fourth Annual Report of the Secretary of the Board of Agriculture. C. L. F.

Boston, April, 1857.

OFFICERS OF THE AGRICULTURAL SOCIETIES,

1857.

MASSACHUSETTS.

President—GEORGE W. LYMAN, of Boston.
Secretary—RICHARD S. FAY, of Boston.

ESSEX.

President—RICHARD S. FAY, of Lynn.
Secretary—ALLEN W. DODGE, of Hamilton.

MIDDLESEX.

President—JOHN S. KEYES, of Concord.
Secretary—SIMON BROWN, of Concord.

MIDDLESEX SOUTH.

President—JAMES W. CLARK, of Framingham.
Secretary—HENRY ORNE STONE, of Framingham.

MIDDLESEX NORTH.

President—TAPPAN WENTWORTH, of Lowell.
Secretary—S. J. VARNEY, of Lowell,

WORCESTER.

President—JOHN BROOKS, of Princeton.
Secretary—WILLIAM S. LINCOLN, of Worcester.

WORCESTER WEST.

President—EDWARD DENNY, of Barre.
Secretary—CHARLES BRIMBLECOM, of Barre.

WORCESTER NORTH.

President—THOMAS R. BOUTELLE, of Fitchburg.
Secretary—JABEZ FISHER, of Fitchburg.

WORCESTER SOUTH.

President—O. C. FELTON, of Brookfield.
Secretary—AARON LYON, of Sturbridge.

HAMPSHIRE, FRANKLIN AND HAMPDEN.

President—ELISHA EDWARDS, of Southampton.
Secretary—H. I. HODGES, of Northampton.

HAMPSHIRE.

President—WILLIAM P. DICKINSON, of Hadley.
Secretary—JAMES W. BOYDEN, of Amherst.

HAMPDEN.

President—GEORGE BLISS, of Springfield.
Secretary—A. A. ALLEN, of Springfield.

HAMPDEN EAST.

President—SAMUEL SHAW, of Palmer.
Secretary—JOHN H. KNOX, of Palmer.

FRANKLIN.

President—JOSIAH FOGG, of Deerfield.
Secretary—JAMES S. GRENNELL, of Greenfield.

BERKSHIRE.

President—ELEAZUR WILLIAMS, of Richmond.
Secretary—E. H. KELLOGG, of Pittsfield.

HOUSATONIC.

President—LEONARD TUTTLE, of Sheffield.
Secretary—JAMES SEDGWICK, of Great Barrington.

NORFOLK.

President—MARSHALL P. WILDER, of Dorchester.
Secretary—H. O. HILDRETH, of Dedham.

BRISTOL.

President—NATHAN DURFEE, of Fall River.
Secretary—LEMUEL T. TALBOT, of Taunton.

PLYMOUTH.

President—CHARLES G. DAVIS, of Plymouth.
Secretary—WILLIAMS LATHAM, of Bridgewater.

BARNSTABLE.

President—SAMUEL B. PHINNEY, of Barnstable.
Secretary—GEORGE MARSTON, of Barnstable.

NANTUCKET.

President—EDWARD W. GARDNER, of Nantucket.
Secretary—JOHN B. KING, of Nantucket.

AGRICULTURAL EXHIBITIONS,

1857.

Massachusetts Board,	at	Boston,	Oct. 20, 21, 22 and 23.
Essex,	"	Newburyport,	Sept. 30, and Oct. 1.
Middlesex,	"	Concord,	Sept. 29.
Middlesex North,	"	Lowell,	Sept. 16.
Middlesex South,	"	Framingham,	Sept. 22 and 23.
Worcester,	"	Worcester,	Sept. 23 and 24.
Worcester West,	"	Barre,	Sept. 17.
Worcester North,	"	Fitchburg,	Oct. 2.
Worcester South,	"	Sturbridge,	Sept. 30.
Hampshire, Franklin and Hampden,	"	Northamptom,	Oct. 7 and 8.
Hampshire,	"	Amherst,	Oct. 14 and 15.
Hampden,	"	Springfield,	Sept. 28 to Oct. 3.
Hampden East,	"	Palmer Depot,	Oct. 6 and 7.
Franklin,	"	Greenfield,	Oct. 1 and 2.
Berkshire,	"	Pittsfield,	Oct. 7, 8 and 9.
Housatonic,	"	Great Barrington,	Sept. 23 and 24.
Norfolk,	"	Dedham,	Sept. 29 and 30.
Bristol,	"	Fall River,	Sept. 30 and Oct. 1.
Plymouth,	"	Bridgewater,	Sept. 20 and Oct. 1.
Barnstable,	"	Barnstable,	Oct. 7 and 8.
Nantucket,	"	Nantucket,	Oct. 13 and 14.

AGRICULTURE OF MASSACHUSETTS.

EARLY FARMING OF ESSEX COUNTY.

From an Address before the Essex Agricultural Society, Oct. 1, 1856.

BY BENJ. PERLEY POORE.

Thanks to the industrious antiquarians, who have gleaned from manuscripts, traditions and old publications, almost every detail of the domestic life of the first settlers, we can constitute ourselves a "committee on farms" and in imagination visit one of the early yeomen. Riding along a "trail," indicated by marked trees, we find his house and cattle-shed standing near an old Indian clearing, encircled by a high palisade, which also includes the spring, that water may be brought without danger from the "bloody salvages." The house, which is over a small, deep cellar, is built of logs, notched where they meet at the corners, with a thatched roof, and a large chimney at one end built of stones cemented with clay. The small windows are covered with oiled paper, with protecting shutters, and the massive door is thick enough to be bullet proof. Pulling the "latch-string," we enter, and find that the floor, and the floor of the loft which forms the ceiling, are made of "rifted" or split pine, roughly smoothed with the adze, while the immense hearth, occupying nearly an entire side of the house, is of large flat stones. There are no partition walls, but thick serge curtains are so hung that at night they divide off the flock-beds upon which are piles of

rugs, coverlets and flannel sheets. A high backed chair or two, a massive table, a large chest with a carved front, and some Indian birch-bark boxes for wearing apparel, are ranged around the walls, while on a large "dressior" we see wooden bowls and trenchers, earthen platters, horn drinking cups and a pewter tankard. The corselet, matchlock and bandoliers are ready for defence, with a halberd, if the senior occupant of the house holds a commission in "ye train-band;" and from a "lean-to" shed comes the hum of the great wheel or the clang of the loom, as the busy "help-mates" hasten to finish their "stents." High on the mantle shelf, with a "cresset lamp" on one side, and the time marking hour-glass on the other, is the well-thumbed Bible, which was not left for show. "Our especial desire is," say the company's instructions, "that you take especial care, in settling these families, that the chief in the family be grounded in religion; whereby, morning and evening family duties may be duly performed, and a watchful eye held over all in each family, by one or more in each family appointed thereto, that so disorders may be prevented, and ill weeds nipt before they take too great a head."

The fare of the Puritan farmers was as frugal as it was wholesome. Pease-porridge for breakfast; bread, cheese and beer or cider for luncheon; a "boiled dish" or "black-broth," or salt fish, or broiled pork, or baked beans for dinner; hasty pudding and milk for supper, and a constant succession of fruit or berry pies at every meal when the housewife had time to make them in addition to her other cooking, her dairy, washing, mending, carding, spinning, weaving and knitting.* Swedish turnips were the staple vegetable; the bread was generally made of corn, barley or rye meal, and if the diet was rather farinaceous than animal, there was less demand for

*"How much may be said of the part that woman played, or rather 'worked,' in the grand drama of our first settlements! What would our Pilgrim Fathers have been without our Pilgrim Mothers? Woman dared to follow when man dared to lead; and she brought with her the humanizing amenities of social life, and the sanctifying power of true religion. She came to this wilderness with a brave heart and a Christian faith, that she might share the perils and brighten the hopes of her husband; and, when here, she looked well to the ways of her household, and ate not 'the bread of idleness.'"—Rev. Charles Brooks.

medicine, and a larger, longer lived growth of men and women than in these degenerate days of luxury and "progress."

Success attended agricultural labor, and the farmers were aware of their dominant position—a position their numerical strength always enables them to maintain when they will. When in 1633, the all potent magistrates declared it "lawful for any man to kill any swine that comes into his corne," the yeomen raised their backs. A convention of two delegates from each town, (the first convention which ever met on this continent,) assembled and called for a sight of the royal charter. Examining it, they resolved that the right to make laws rested not with the magistrates, but with the freemen; nor did they cease their exertions until they established the law-making and money-raising power of the general court, in 1634. The sacred flame of Massachusetts freedom was thus first fed by lard oil! It was probably some offending porker which had taken liberties with Governor Endicott's garden, or had damaged Mr. Winthrop's lawn with his insinuating snout, which thus formed the germ of our popular institutions, and the parent of that august body which has so ungratefully adopted a cod-fish as its emblem!

At the first session of the "general court," (which only lasted three days,) "the regulations respecting trespassing swine—the immediate cause of the late political change—were repealed, and this matter was left to the several towns. It proved, however, an embarrassing subject and was often afterward before the court. The next year—1635—the practice of impounding stray animals was introduced, much the same as exists at present. The year after, a special officer, called a 'hog-reave,' was ordered to be elected in each town, to look after those animals; but frequent changes afterward in the law upon this subject, showed how difficult it was to reconcile the conflicting interests of the corn growers and the pig owners. A small matter this for history, but why smaller than other like conflicts of interest, of which so much of our politics consist."

One of the first, if not the very first agricultural patent issued in this country, was granted by this general court, over two hundred years ago, for "an engine for the more speedy cutting of grass," which is undoubtedly the first mowing machine on record, though there is no record that it was of any

practical use. It was patented by Joseph Jenkes, Sen., a scythe manufacturer of inventive genius.

But it is not my intention, for I have not the time, to detail the gradual advancement made in agriculture by the Puritans, whose success was the "admiration of their times, the wonder of the world." As was the case in ancient Rome, the free cultivators not only increased the resources of the state at home, but defended her front against the assaults of her enemies. In 1650, the yeomen of Massachusetts Bay had one thousand acres in gardens and orchards, and fifteen thousand acres in tillage, twelve thousand cattle and three thousand sheep. Yet they had not only subdued the soil, but conquered its savage occupants, and at a heavy expense of time, blood and treasure. Let us never forget "the Flower of Essex," who so bravely fought and fell under that brave Beverly farmer, Capt. Lot Cross. He had brought back from Port Royal, in 1654,—as his share of the spoil,—the bell of the "New Friary," which he gave to the meeting-house of his parish, little dreaming probably, that it would toll for his defeat in 1675. Yet such is the fortune of war.

"And that sweet nameless stream, whose flood
Grew dark with battle's ruddy stain,
Threw off the tinge of murder's blood,
And flowed as bright and pure again.
But that wild day,—its hour of fame,—
Stamped deep its history's crimson tears,
Till Bloody Brook became a name
To stir the hearts of after years."

The secret of the success of the Puritans, may be found in the grants which were given to the colonies, which, at that early day, swarmed forth from the parent hives, to colonize New Hampshire, Vermont and Maine. The church and the school-house were regarded as the inseparable foundations of society, and it was wisely argued that useless were the benefits of the one without the influence of the other—religion without knowledge producing bigotry, and knowledge destitute of religion, leading to infidelity. One hundred and twelve years after this great principle had been established at Plymouth, the council confirmed it by the following conditions, on which the

town of Boscawen, N. H., was granted to a colony of emigrants from the town of Newbury. Mark the language :—

"That within the space of four years from the confirmation of the plan, they settle and have on the spot eighty-one families; each settler to build a good convenient dwelling-house, one story high, eighteen feet square at least; and fence, clear and bring to, four acres fit for improvement, and three acres more well stocked with English grass; and also to lay out three shares throughout the town, each share to be one eighty-fourth part of the said tract of land, one of said shares to be for the first settled minister, one for the ministry, and one for the school; and also to build a convenient meeting-house, and settle a learned orthodox minister, within the time aforesaid. Dec. 8, 1732. In council, read and concurred."

It was this constant care of the church and of the school-house, with a due regard for the proper cultivation of the soil, that made the Puritans superior to us of the present time. Their social life stands the test of experience, while modern, rainbow theories, vanish like morning clouds. Theirs was the true philosophy of sylvan enjoyment, while our communities are filled with crack-brained zealots, whose only occupation is a constant endeavor to climb some visionary ladder of "reform," then stand in the air on an unsupported "platform" and draw the ladder up for a new "progress" into the clouds. Glorious old yeomen.

"Motion was in their days; rest in their slumbers;
And cheerfulness the handmaid of their toil;
Nor yet too many, nor too few their numbers—
Corruption could not make their hearts her soil;
The lust which stings, the splendor which encumbers,
With the free foresters divide no spoil;
Serene, not sullen, were the solitudes
Of these unsighing people of the woods."

The martial spirit so carefully fostered by the Puritans, was never suffered to decay, and the Pine Tree Flag of Massachusetts was sustained in triumph by her yeomen, at Quebec and at Louisburg, at Ticonderoga and at Crown Point. Then came the Revolutionary struggle; but had we been a nation of cities then as now, it is doubtful if Independence would have been

declared, for we should have been so accessible to attack, that it would have been madness to have commenced that "Resistance to Tyrants" which is "Obedience to God." As it was, tories abounded in the cities, each of which was in turn occupied by the red coats; and all must admit that British power was prostrated on this continent by the hard-handed operatives of iron nerve, a majority of them yeomen, who left their ploughs in the furrows, to aid the Farmer of Mount Vernon in unyoking their land from tyranny. The men of one town of our county—Danvers—marching sixteen miles in four hours—were so prominent in Bunker-Hill fight, that their dead was one-quarter of the whole loss. I have yet to learn that a single farmer of Essex, in that trying hour, was *false to freedom!* Should the crisis arrive, may we set for our posterity the same great example of devotion to American principles, which our forefathers have left us to imitate. And may we never forget that when Rome—that victorious, imperial mother of nations—suffered her urban citizens to "crush out" the cultivators, by unjust taxation and the free admission of agricultural products, her power began to wane. Long before the race of the patricians had become extinct, the free cultivators had disappeared from the fields, leaving no recruits for the once victorious cohorts, which now fled before the invading Goths. Truly Goldsmith said:

> "Princes or kings may flourish or may fade,
> A breath can make them as a breath has made;
> But a bold yeomanry, their country's pride,
> When once destroyed, can never be supplied."

Peace spread her halcyon wings over the new-born Republic; and her soldiers, like Cincinnatus, returned to their farms. Sedate, substantial edifices sprang up over the country in place of the log-cabins and smaller structures; the farmers religiously aiding each other at raisings and shinglings, as at their hoeings and huskings. There may be more architectural beauty in the fanciful Pinco gothic architecture of our time, but these farm-houses, like a substantial old gentleman who has settled down to live on the interest of his earnings, had a well-to-do look. In the centre rose a massive chimney, between which and the front door was a small entry, with a stair-case having

curiously carved banisters. On either side of this entry were large rooms, opening into a kitchen which, with a small bed-room, occupied the whole rear of the house. The "best room" often had a small Turkey carpet on its snow-white floor, and in its cup-board was the good dame's china tea-set, while the "fore room," on the other side of the entry, contained a high eight-day clock, some framed "samplers," and a large "comb-case" hanging beside the thick plate mirror. But the most comfortable apartment was the kitchen, or "keeping-room," with its low ceiling, its dingy unpainted pannel-work, and the old "queen's arm" reposing on wooden brackets over the mantle shelf. The younger portions of the family had their settles within the jambs of the huge fire place, in the flanks of which yawned the mouths of the great and little oven, the old blue dye-pot faced the pickle firkin, and the well-worn spit hooks on the high iron andirons, testified to the abundance of good cheer. In the beaufat, or corner cupboard, glistened the pewter platters, the porringers for the porridge, now replaced by coffee and tea, and the tankard for the generous cider produced on the farm. The "cheese-room" shelves groaned beneath the weight of the products of female industry, and the well-filled presses in the bed-rooms proved that neither the spinning-wheels nor the loom were long idle.

"Our ancestors lived on bread and broth,
And wooed their healthy wives in home-spun cloth,
Our Grand'ma's nurtured to the nodding reel,
Gave our good mothers lessons on the wheel.
Though spinning did not much reduce the waist,
It made the food much sweeter to the taste.
They never once complained as some do now,
'Our Irish girl can't cook or milk the cow,'
Each mother taught her red-cheeked, buxom daughter,
To bake, and milk, and draw a pail of water.
No damsel shunned the wash-tub, broom or pail,
To keep unharmed a long-grown finger nail.
They sought no gaudy dress, no hooped-out form,
But ate to live, and work'd to keep them warm."

While the domestic manners and social life of our ancestors were worthy of high commendation, little can be said in praise of their system of agriculture. The meadows were left un-

drained, and the exhausted uplands bore but scanty crops or were abandoned to weeds, under the mistaken idea of fallow-rests. Barns were moved (tradition says) to get them away from manure heaps considered an incumbrance; wood ashes were sold at a song, and there was a stagnant pool beneath the sink spout. The horses and cattle were so badly housed and fed during the winter, that they cast but faint shadows in the spring, while the gardens were mere vegetable patches, with a few straggling marigolds, roses and lilacs, contending for the mastery along the wall, with milkweed, Roman wormwood and burdock. A bulbous root, cultivated on the window sill in a cracked earthen bean-pot, was deemed an aristocratical luxury.

This was not unnoticed by the "fathers of the country." Jefferson experimented on his farm at Monticello,* and Adams on his farm at Quincy. Washington's farm was his delight, and amid all the embarrassments attending the establishment of the new system of government, he found leisure to hold an interesting and voluminous correspondence upon husbandry, with Sir John Sinclair. Luckily for Great Britain, Sir John succeeded in establishing an Agricultural Board in that kingdom, but no action has yet been taken upon Washington's first recommendation to Congress urging the "advancement of agriculture." This he evidently considered the most important matter, and—last of all—he recommended "facilitating the intercourse between different parts of the country." Every one of his successors down to the present incumbent, has in turn advised the "advance of agriculture,"—yet Congress has done nothing on the subject except to obtain seeds for the member's individual distribution to political friends. Of the five million three hundred and seventy-one thousand eight hundred and seventy-six free male citizens over fifteen years of age, who inhabited this Republic in 1850, (when the last census was taken,) two millions four hundred thousand five hundred and eighty-three were engaged in agriculture; yet I regret to state that the committees on agriculture, both of the Senate

* Among other interesting letters on agriculture by President Jefferson, is one to the Hon. Tristam Dalton, who then carried on the Spring Hill Farm in West Newbury, now owned by Doctor Robinson. After speaking of root crops, he describes and recommends the "side-hill plough," invented by his son-in-law, Col. J. M. Randolph.

and of the House, are nominal bodies, which rarely meet and never report any bills. We hear nothing in Congress about plough shares, though could the furrows throughout the Union be deepened one inch next spring, it would add one million of dollars to our national wealth next fall. Yet every one, both in and out of Congress, is posted up on the price of shares in the railroads which are "facilitating the intercourse between various portions of our country," and which are not more remunerative than is a potato crop when the rot is prevalent.

Agricultural societies were first formed in New England about the commencement of the present century, and among those who took an active part in improving husbandry, were the clergy, whose parsonage farms were often models to the country round. No work, probably, has been of such practical utility to the farmers of New England, as the "Georgical Dictionary," published by the Rev. Dr. Deane.

During the meteor-like career of Napoleon the Great, the disturbed state of European politics raised the price of produce abroad, and gave our home agriculture a decided impulse from the embargo, which forced men back to mother earth for support. But it was not permanent. When the silver-toned trumpet of peace was sounded, prices fell; the almost total failure of the corn crop in 1816, had a discouraging effect, and the slow progress of agricultural industry caused it to be looked upon as a subordinate employment. Boys were made to toil with worn-out tools until they generally escaped to sea or to the city, while the professions were looked upon as the only stepping-stones to honor or to high social position. It is a curious fact, however, that the most eminent of those who deserted the old homestead to enter upon "the golden chase of life," ever yearned for the bosom of mother earth, and finally returned to it. To me, the most interesting chapters of their biographies are those which chronicle their agricultural labors. Jackson at the Hermitage, Calhoun at his mountain farm, Henry Clay at Ashland, and Webster at Marshfield, each paid a practical homage to agriculture, and consecrated those spots as heart-shrines to be remembered with Mount Vernon and La Grange. Majestic as was the form of the "Expounder of the Constitution" when he upheld the honor of Massachusetts upon the floor of the United States senate chamber, how much more

interesting would be his portrait, when, raised on his death-bed, he took a last fond look at his herd of cattle, which he had requested might be driven slowly before his window, one by one.

The "Massachusetts Society for Promoting Agriculture" was organized in 1792, and among its one hundred and forty-seven original members were, John Hancock,—who approved the act of incorporation as governor,—John Adams, Samuel Adams, Fisher Ames, George Cabot, John Brooks, Elbridge Gerry, William Heath, Benjamin Lincoln, Samuel Phillips, James Sullivan, and other eminent Massachusetts men. The contributors to its original fund, raised "to be distributed in premiums for the encouragement of useful discoveries and improvements," were mostly "solid men of Boston," but it was the official boast of an editor of its journal,* in after years, that its original roll embraced "members in all parts of Massachusetts and Maine, at least seven-eighths of whom were chosen from *agricultural* counties." Truly did the same gentleman, (Hon. John Lowell, a native of Newburyport,) remark: "The institution was ahead of the age and of the intelligence of the State, and of public spirit. Its first two volumes will show that the trustees were not remiss. Their queries, distributed all over the State, prove their zeal, their intelligence, their intimate knowledge of the real wants of agriculture." Nobly did the farmers of Essex follow the example of Pickering, Cutter, Kittredge, Spofford, Tyng, and others who took a deep interest in this State institution, and in 1822, when it numbered over seven hundred members, one hundred of them belonged to this county. The early Transactions show that many premiums were claimed and won by those who tilled the "Pleasant Watering Place," and when the "Brighton Shows" were instituted, in 1817,† Essex county was never backward in sending the best specimens of her flocks and her herds.

The "Essex County Agricultural Society," was formed in 1818, by twenty-one practical farmers, who met at Topsfield, organized, and elected Col. Timothy Pickering their president.‡

* Massachusetts Agricultural Journal for 1823.

† The "Oakes Cow" was exhibited at the first Brighton Show.

‡ See Address of J. W. Proctor, in 1844, and an interesting biographical sketch of Col. Pickering, written for the "Albany Cultivator" by the same gentleman.

This illustrious patriot, after having served bravely and faithfully in the war of the Revolution, and in the early councils of the infant republic, reappeared among his fellow-citizens, as zealous in the cause of agriculture as he had been in that of independence. For ten years he not only diligently labored to advance the interests of this society, but cultivated his farm at Wenham with such practical skill as won the confidence of those to whom he recommended such improvements as he had found of practical utility. "At an age when most men think their labors should be ended, he was in his prime in handling the plough and instituting new experiments."

The early records of the society show the deep interest taken in the society by the practical farmers of the county—an interest which increased as the exhibitions were successively held in different towns, enlisting in turn the residents of every section. Howes, Mosely, Parsons, Derby, Bartlett, Newhall, Pickman, and other gentlemen, unknown neither to fame nor fortune, manifested a deep solicitude in the interests of the association, and their efforts were crowned with such success as to entitle them to the lasting gratitude of all who succeed them. "*Lector si monumentum requiris circumspice*," is the legend which meets the eye of the visitor to St. Paul's Cathedral, as he halts before the tomb of its illustrious architect. So we have but to recall the services rendered to agriculture by the founders of this society, then point to the smiling face of old Essex and say, "If you seek their monuments, look around."

Thanks to the persevering labors of the trustees of this society—to the able secretaries, who have made every cog of every wheel move harmoniously along—to the unequalled set of Transactions, "apples of gold in pictures of silver"—to the wide circulation of the New England Farmer, the Massachusetts Ploughman and other sterling publications—to a more healthy state of public opinion—and last, though by no means least, to remunerative prices and good markets, agriculture is becoming, not only a more popular, but a more profitable pursuit. This success, of course, has its attendant train of reverses, and the Transactions of this society show the folly of mounting every agricultural hobby presented by crafty speculators, or visionary theorists.

The cultivator who expects to enrich his land by some

magical process, will find that though he may analyze a spoonful of dirt, and have a prescription made up at a druggist's and scatter on the "lacking ingredients" from a dredging box, he will not get quite one hundred bushels of corn to the acre. The mere planting of a morus multicaulis cutting will not be sure to produce a mulberry tree, the next day, with silk stockings and figured ribbons hanging from its branches. Of what use is a rooster tall enough to eat from the top of a flour barrel, if the exertion of crowing makes him fall over backwards, and you have to run and pick him up whenever your hear his hoarse note? Nor do we find many farmers who continue, year after year, to raise China-tree-corn, or Rohan potatoes, or new fangled grasses. A great flourish is occasionally made by those who delight in using unintelligible terms to express ordinary ideas, but we too often see the real mark of successful yet profitable agriculture terribly overshot by the gallipot zealots. Like old Acestes in the Æneid, they do not shoot the pigeon, but the clouds, and the clouds burn and blaze, and stars dart across the sky, and all men cry—a miracle. But with all this, the proper aim of the archer was the pigeon, not the clouds. It is not my purpose to cast any slur upon agricultural chemistry, or scientific farming, but I do contend that neither is of much account if unattended with practical ability, common sense, and honest hard work. Theory is good, but practice makes perfect—the two mingled together are invincible.

Having glanced at the history of agriculture in our county, it may be well to examine its present position, as displayed by the official statistics of the Commonwealth—its ledger in fact, in which every citizen can cast up the accounts of his own occupation or locality, and see its "profit" or "loss." Let every Essex county farmer take a good look at those columns in which the agricultural productions of the State are recorded —and probably there has been as much honesty in answering the questions of the assessors faithfully, in this region, as elsewhere—that he may see exactly where we stand. While the tell-tale figures show that the agricultural productions constitute nearly one-third of the entire amount of what the labor of the county contributes to the real wealth of the Commonwealth, they are not very encouraging in other respects. I would that it were otherwise,—although I have no disposition to contribute

to the top-dressing of flattery which most speakers spread over every thing agricultural,—but there the statistics are. There is not a variety of crops, I regret to say, of which our average yield to the acre is not surpassed by some other county, and we cannot therefore lay the slightest claim to agricultural pre-eminence. In Indian corn, rye, barley, oats, onions and turnips, we are just above the average taken throughout the State, and in each other crop, other counties surpass us. Worst of all, in wheat and potatoes, the Anglo-Saxon and the Celtic staffs of life, we are below the mark. This, too, at a time when "the increase of vegetable food in the United States, has rather fallen behind, than kept up with the progress of population." *

Some may find comfort by discovering a great increase over the productions reported in 1845, but if they will but read—as every man in this assembly should read—the agricultural survey of the county, made nearly twenty years back, they will again find a sad falling off. Then, we had 6,252 sheep; now, we have but 2,217; although experienced agriculturists have recommended sheep growing as a profitable branch of husbandry, well adapted to our soil and our climate.† Then, the average yield of oats was thirty-three bushels to the acre; now, it is but twenty-four; and the wheat crop, most important of all, has diminished down to the average of fourteen bushels per acre. In 1817 the farmers of West Newbury raised 1,325 bushels of wheat on fifty-eight acres of land—an average of over twenty-two bushels to the acre—though our worthy president produced eighty-one bushels to two acres and a half, or thirty-two bushels to the acre. Last year the same town only produced one hundred and one bushels on eight acres, or thirteen bushels to the acre. In 1822, the Messrs. Little, of Newbury, raised one hundred and sixteen bushels and nine quarts of sound shelled corn to the acre; last year, the average yield in the same town was but thirty-eight bushels to the acre.

This is not as it should be. It will never do for Essex county

* "Statistics of Agriculture." Hunt's Merchants' Magazine, July, 1856.

† It has been stated as a reason for this falling off, that our farmers find hay, milk and fruit, more profitable; yet, in these products, Essex is behind Worcester and Middlesex counties.

farmers to be thus backing down the hill of progress, and flatter themselves that they are "getting along." We must hitch on our whole team,—heart, and hand, and mind,—"go ahead," and reach the summit. It will not do to let our agricultural gondola rot in the back-water of fogyism, and if we can't keep in the current of progress with the old fashioned oars, we must put on steam and propel with the rest of them. Authentic statements, published in the Transactions of this society, and of the Massachusetts Society, show us what can be done by detailing the amount of crops which have been raised on one acre of land, at different times and in different parts of our county. Wheat, thirty-two bushels; corn, one hundred and seventeen bushels, (at fifty-six pounds to the bushel;) barley, fifty-two bushels; potatoes, five hundred and eighteen bushels; carrots, nine hundred bushels; beets, seven hundred and eighty-three bushels; onions, six hundred and fifty-one bushels; hay, five tons in one season. Now, to use the words of the lamented Colman, "what has been done can be done again, and instead of stopping short at what has already been reached, we should never be satisfied without at least attempting to go further." With these figures and these facts before us, I can but think that it behooves the farmers of Essex to deepen their furrows, to increase their supplies of home-made fertilizers, to sell less hay, to plant new orchards, to keep more calves, and, above all, to raise a generation of working boys and girls, that we may better sustain the agricultural fame of our pleasant homesteads, in which, after all, we have but a "life-estate."

AGRICULTURAL HEAD-WORK.

From an Address before the Middlesex Society, Sept. 30, 1856.

BY A. R. POPE.

No form of labor invites so freely, or repays so promptly, the head-work of the laborer, as agriculture. Nature does not reveal her secrets, or declare her processes unquestioned; but to keen intelligence, she constantly offers something new and valuable.

There are always likely to be two classes of farmers, as there are two classes of mechanics, and lawyers, and ministers; those who only move in one direction, and never allow themselves to leave the ruts which their sires' or their grandsires' operations wore, and those who continually have an eye to the immense advantage which may be derived from constantly pressing inquiry out into the unknown, and seldom fail to bring home daily, or yearly, some new gain either in the extent of knowledge, or in its application to the labors which are to be performed. The former farm only for a living; and potatoes at one dollar a bushel are a better crop, no matter how inferior their quality, than the best of potatoes at only fifty cents a bushel; the others, without neglecting any thing which will inure to their positive benefit, yet see in agricultural pursuits something which will help the mental powers to expand, so that the hardest toils may be studded all over with the springing germs of intelligent thought.

Reduced to its simplest statement, the object of farming arrangements is to yield sustenance of various kinds for animal life. But this object implies something more than planting and reaping. The Indian, who had neither plough nor spade, planted his maize upon the surface, scraped a few rotted leaves and a small quantity of the virgin soil over it, went on his hunting errand, and came back in due time to a fair harvest.

But, although we may continue to hill up the corn on high and low land, in dry and moist soil, alike,—following the savage, who had no other way to do,—it is very certain that New England corn fields now need considerable looking after between seed time and harvest. And the problem of accommodating the limits of human strength, and the capacity of the soil, to the wants of human nature, becomes, in consequence, more complicated and more difficult of solution. It is not enough to inquire how we may get the most produce every year from so many roods of surface. There is a sad fallacy in the beautiful rhetoric often quoted on agricultural occasions, that "he is a public benefactor who makes two blades of grass grow where one grew before," because an important condition still needs to be annexed, namely, *without impoverishing the soil.* There is no soil rich enough to bear this exhausting drain. For though you may pass the hoe handle to the blade, through the rich deposit of mould, only a very limited portion, in its present position, will help to sustain the crop upon the surface. And, by unsystematized cropping, the fattest prairie lands of the West will soon send back the wail of barrenness which now comes from Virginia, after two hundred years of improvident culture of the richest lands in the known world.

Then, again, it is not quantity alone, but quality, which must be regarded. Cobbett, long ago, pleaded against the dependence of Ireland upon the potato root; not merely because it was poor policy to have the life of a realm incident to a culture which might at any time prove profitless, but because the profusion in quantity of the crop was likely to banish other edibles from use, while its quality,—containing as it does, seventy-three per cent. of water, and less than thirteen per cent. of nutriment,—was not suited to nourish the higher manly properties upon which, more than upon a given amount of flesh and muscle, manly prowess must depend. That is, that, which will merely sustain life, will not give vitality to it for its higher forms of development. So he would now read Irish history backwards, and say, that, if Ireland has been content under misrule, stolid before governmental deceit, and reckless of mental culture, she owes it as much to the charac-

ter of her food, as to the laws of the realm, or to the ministers under those laws.

The quality as well as the quantity of production must enter into the computation of agricultural wealth. The whole problem which the farmer must solve, is substantially this: How to secure the greatest quantity of the most available and best productions from every foot of cultivated land, without detriment to the soil. Any one who thinks that this problem can be solved without patient, aye, and laborious thinking, or that there is no room here for head-work of the raciest kind, is a *know nothing*, without belonging to any particular political party.

Now, it is by no means proved to a demonstration, that mankind has compassed the most fundamental part of this proposition, the annual cropping of the land without its impoverishment. Nature's system of agriculture produces stalwart oaks and lofty pines, luxuriant maples, spreading elms, and lithe birches, and yet the soil beneath them daily grows richer. Indeed, so much of vegetable life depends upon the gases, and these, extracted from the air, do so much to form the substratum of the perishing fabric, that, when the tree drops its robes of freshness and beauty in the autumn, the decaying leaves may yield more than they had received. But man is no such husbandman. He boasts every year of more acres reclaimed—that is, brought under his subjection, to be cheated out of their strength, and, in a familiar old phrase, "to be carried to mill in corn-sacks." When he has worn out his fields, he is mean enough to leave them to nature's kinder treatment, and allows them, in neglect, to lie fallow as pastures, and fatten slowly on air.

Any one can dig, trench and manure, and plant, weed and gather the harvest; if these processes cover the province of agriculture, it is plain to see, that art has contrived to do most of this work by machinery. Indeed, this fertile age of machinery is likely more than ever to infertilize our fields, by making man more powerful, but not more thoughtful, and giving to New England and the West, the very element which has cursed some other states, namely, unthinking labor—labor without head-work.

But there are generations to come after us; and for these, if not for its own dignity, agriculture must be just, if not gener-

ous, to the earth. Those generations cannot live on curious machines, or mighty inventions, or great learning. They are to be clothed and fed from the very same soil which we now till. There will be a time when no more territory can be annexed to the domain of civilized life, and no more rich prairies of Kansas will remain to be wrangled about, and then the generations of men, with all their learning and ingenious contrivances, with ships crossing the Atlantic, for aught I know, in an hour or less, will, no doubt, be born with mouths to be fed and bodies to be nourished and clothed. And as God will not see fit to make a "new earth" to atone for any misuse of its properties, it becomes mankind to set about keeping this one *as good as new*, to say the least. He has given to us this garden of rich bloom and abundant harvests, to till and to dress; to be subdued, but not to be despoiled.

Agricultural chemistry will afford one of the means to the true end. In nothing is scientific research greater than where it analyzes results into elements in order to assist in reproducing those results in more complete consonance with the true laws of production. And we have been greatly aided in this direction by the labors of able men. Their results are before the world. But to how many are Liebig's Agricultural Chemistry, or Liebig's Chemistry of Food, or Dana's snug little Muck Manual, with a number of similar treatises, all aiming in different ways to derive what is necessary from the soil without robbing it of its capacity,—how many of these will you find familiar hand-books, even among the members of a society like this, established for just such a use? I shall not presume to answer the question. Happily, the weekly newspapers are doing some good work in this direction; but they would do much more if our farmers would give their heads more employment, not to save their hands from doing work, which seems sometimes to be an object of agricultural inquiry, but from doing mischief.

If it is the particular business of the husbandman to furnish to the world the resources of material life—and all the trade and commerce of the world must hinge on this—it ought to be as much his care to leave his acres entirely unimpaired in their fertility. Even if his descendants could ever reclaim the wasted fields, it is scarcely honest to leave to posterity such an incum-

brance upon the land, in a mortgage to poverty, signed in its name, with so many years' unpaid interest already accumulated. What then can happen in such a case, but that the mortgagee must secure a foreclosure, and enter into possession with a clear title. Over-cropping, unskilful manuring and hard labor, may, for a while, make "two blades of grass grow where one grew before." Agricultural head-work has a duty to perform in protecting the soil from all forms of vandalism, by which its nutrient properties are in any way or degree reduced.

And much more may be said concerning the *quality* of these products. Bulk, certainly, is no criterion of the value of the crops. The support of life will come from the wheat, not from the chaff. This agricultural society, and all similar organizations, are based, professedly, upon the purpose of improving these products. And no man is fully true to the spirit of such an association, who will admit that any product is quite good enough.

There can be no better way to test the possibilities of the future, than by the results of the past. Your tables are now graced by the presence of great names, which will find, as most of the self-elated great ones of earth may do, very little to boast of at the beginning of their pedigree. The Duchess of Angoulême, Charles of Austria, Frederick of Wirtemberg, Marie Louise, Napoleon, are certainly among the pear nobility. But they are all liable to the terrible reproach of being *parvenu;* they must acknowledge a common descent from a fruit, upon which, our Choke Pear is a decided improvement. Pliny, in the first century of our era,—and this is quite late in the genealogy of the family,—speaks of the great number of varieties, but adds, "all pears whatsoever are but a heavy meat, unless they be well boiled or baked." The apple does not aspire to such high sounding titles; but no one would guess from its present quality,—as judged by the Baldwin, Rhode Island Greening, Hubbardston Nonesuch, Newtown Pippin, or Northern Spy,—that the original was a wild crab of Asia, similar in all respects to the wild crab of Europe and America. Beside these instances of improvement, it may be observed that the reputed, and now generally admitted ancestor of the luscious Early Crawford, and Coolidge's Favorite,

was a Persian plum, once supposed to possess, in its whole mass, the poisonous property which chemical analysis has discovered in the seed. Among vegetables, the huge squashes are to be regarded as monstrous or abnormal expansions of the blossom stems for capsules, or seed-vessels.

It would seem from such illustrations, as if the great Inventive Mind and Artificer of Nature, had thus purposely left in His unfinished and incomplete work, the sphere of performance which human intelligence may be both proud and happy to fill. It is certain that there are vast capacities for improvement concealed, as it were, in the ordinary processes of vegetation. It is also certain that human industry and assiduity may combine with the intelligence which comes by observation, and grows by its own exercise, to work new combinations among the elements of productive life, much in the same way as these same faculties contrive forms of fitness, convenience, luxury and beauty, out of the clay, and sand, and metal, and wood, which constitute the material world around us.

But, view it as we may, this capacity for improvement in quality, is at once a most mysterious concentration of latent force, and a matter of most practical importance. The great question is not an economical one, or how shall we make the most of this capacity, and turn it most readily to human advantage, but, how shall we do our duty by it. And the answer comes almost as readily as the question—by men forgetting it in the midst of our toils, and by adding head-work to hand-work. It is not enough to have the "earth yield her increase" in abundance. That increase must be made better in quality, and more desirable, year by year.

Every agriculturist should conscientiously keep a two-fold purpose in respect to the quality of the productions he raises. First, never to allow a good thing to deteriorate on his hands; and second, to be continually taxing the forces of nature to produce a better than the best product yet known. As I have already said, nature is not going to pour out her choicest treasures at our feet, unsolicited: she may give us something now and then to tempt us to seek for more,—as gold, scattered in small particles upon the surface, guides and stimulates the miner to search deeper for the real ore.

In vegetable life, it must also be remembered that deteriora-

tion is quite as possible as improvement. Man, in neglect, will run back into barbarity—the undeveloped type of human life. Who can think that the fruits of the earth will be any more stable? You may have seen the account of wheat recently raised in France from seeds preserved in the coffin of one of the Gallic kings, and of course, fourteen centuries old, at least. It has been proved to be identical, in its botany, with the wheat of the present day. But it produces from sixteen to twenty stalks to a grain, and has an average of twenty grains more on each stalk, than any wheat of the present day will produce; and each grain is heavier.

Now, I ask, what has man to say for himself that he has thus let the "staff of life" run down in his hands? He ought to have improved it. It would have been mean enough to have said, "There hast thou that is thine," without interest, without betterment. But he has been eating his *best* grain, generation after generation, or reaping and selling the earliest of his harvesting *because it paid best;* and he has often sowed the seed of a poor crop, which he could not sell, because some untoward circumstances had injured it, when he ought, if it were necessary, to have picked out kernel by kernel, so as to have been sure of good seed, at all events. Considering their ignorance, it is not worth while to say hard things of men who lived in a darker period of the world, and on the other side of the Atlantic. But it would be a mighty problem in arithmetic, to estimate the comfort and wealth which might have been enjoyed, if the produce of every wheat-field for fourteen centuries, with the same expenditure of labor, had been fifteen per cent. greater than it was. The lesson is, not to repeat such a blunder, which, now-a-days, would be a crime.

I cannot, however, but call your attention to the fact that every year's cropping is making it less and less likely to keep the present races of vegetable life in as good order as they now are, without constantly increasing care, because every year introduces new varieties into the fields and gardens; and these are the results of good and bad mixtures, and themselves the ready fertilizers of another year's seeds. But the multiplication of new varieties also tends to the neglect of old ones, some of which may be better than those with more modern names. The progress is not very valuable, which only substi-

tutes a new thing for an old one. The domain of agricultural possessions is enlarged, when, keeping the old variety in all its purity, we get another fully equal to it, and maintain both.

The importance of seed propagation is not, I think, sufficiently felt among husbandmen. But there is no variety yet discovered, which will not, in common phrase, run itself out in this way. As a mere matter of policy, it must seem obvious, that whoever wishes to keep up a stock of the earliest pease, must save the seeds of those blossoms which were fertilized before other pease were in bloom. Whoever wishes to keep a squash, or cucumber, or melon, true to that quality which belongs to its vine, must protect its blossoms from the contacts of bees and bugs for one day. Whoever has a favorite peach, whether itself grown on a budded stock or not, can raise the same in successive generations, by securing a single blossom from all admixture from other trees for three days,—one before, and two after its opening,—himself attending, if necessary, to the fertilization from its own stamens. I have no faith to believe that seed culture is *universally* practised on any such principles. It surely, however, requires very little common sense to perceive that a cultivator cannot afford to cull his seeds of any kind, with his eyes blinded; or, which is much the same thing, with his mind inactive and sluggish.

This attention of every farmer to seed culture has become economically the more necessary, because the deleterious hybridization of seed-plants is now a matter of general complaint. It has not escaped your notice that it is quite impossible to find a place where any one can buy seeds warranted by the vender to be uniformly genuine. A prudent seedsman, with his eye teeth cut, and his eyes open, will not be likely to commit himself farther than he who told the purchaser, "Sow them carefully, and if they don't come true to the name on the paper, *bring them back*, and you shall have your money again." The manner of raising seeds renders it unavoidably a mere chance whether you buy a pure article or not; and this remark does not question the highest integrity of the dealer. The mischief lies not at his door; but it will continue to be experienced until seed culture, under scientific directions, is made a business by itself. And meantime, I believe the farmer can better afford to raise his own seeds, if he will do it

carefully, than be annually disappointed in his crop, though a division of labor would be better.

This separate work of honestly raising seeds for the market, according to the well-known principles which regulate all reproductive life, is an enterprise which invites the attention of neat and patient cultivators. It should be a business by itself, and it will be one quite certain to yield an abundant remuneration as soon as it is well established. The success which has attended the Shakers in their purpose to supply the markets, and their failure to keep up, with all integrity of purpose, the original value of some of this kind, is the guarantee of what may be done by others, or by them, on a different basis. Indeed, I am not sure but that its great importance is such, and the facility so certain, that seed raising might well be made a principal object at the State Farm; the labor upon which, would thus immediately and profitably lift husbandry to a better position, by insuring a truer quality to its seed-raised products.

But out of the same attention will proceed, not only the preservation of varieties, in their present full value, but also the second obligation, which is more interesting and inviting, namely: the *invention* of new ones. Mechanical enterprise has generally claimed this word, and ingenuity and inventive genius have been chiefly accredited to its demands. In the science of agriculture, the ordinary husbandman, unfamiliar with the methods of scientific analysis, cannot well achieve much. But in the art of husbandry, that is, in the combinations of recognized principles and material forces, or properties, habits of practical observation are the main dependence. And the farmer is the very man, in this way to *invent* a new fruit or a new vegetable.

Nature is strikingly apt at helping nearly every effort in this direction. Her accidental combinations, or hybridizations, are oftentimes very valuable. Our best apples and pears, and nearly all desirable vegetables, are instances of this. I have spoken in another connection, of the vast improvement in quality already begotten by this means. It is rather humiliating to man's asserted dominion over the life below him, that he has had very little to do with acquiring a title to some of the best products of his orchard, garden and field.

But all this, however, may establish the conviction that if good results have happened to us, they may as well be produced by care. There is no limit to the new combinations which can be devised and intelligently executed. But prior to undertaking such an enterprise, so fraught with great possibilities of advantage, a general knowledge of vegetable physiology may be indispensable. This must be acquired,—it will not come by instinct,—and acquired from books or by observation. Then the special character of the particular species to be worked, ought, of course, to be fully apprehended. Though nothing is easier to effect, and nothing more difficult to prevent, than the indiscriminate mixtures of vegetable varieties, scientific hybridization contemplates something very different. The head as well as the hand must have something to do with it.

I do not care to hold out the idea that every venture of this kind will be crowned with a great result. Some of the experiments within my own limited experience, have excited more surprise by failure, than others have by success. Two years ago, I attempted to improve upon the well-known Green-flushed melon, by combining with it the delicious, but tender Cassabar melon, the seeds of which, came from the Patent Office; and this year, for the pains and precautions, which were as ample as the case seemed to require, I raised—as far as fitness for the table was concerned—something resembling a second rate ripe cucumber. But, on the other hand, I have to-day placed on your table a squash, which is a hybrid of the white pumpkin (*potiron blanc*) and the bell-shaped squash (*courge en forme de cloche.*) The hybrid, in color and contour, resembles neither parent, but yet bears the marks of both. In size, it is eight or ten times as heavy as the larger of the two, and weighs eighty-five pounds. The quality has not been tested. If the question arises, whence the deterioration in the one case, it is answered by showing the increase in productiveness in the other. Besides, I still have my original melons, and will manage, for the present, to be therewith content. I have a squash, however, such as nobody else ever saw before, and I mean to hold on to it, if it is as good as it is great.

Some years of study and observation have convinced me that the laws of vegetable hybridization are just about as well understood as the laws for the transmission of mixed qualities

in animal life; and that is not saying much. Uncertain as the results sometimes seem, there is yet considerable precision in the operation of all obvious rules. Common sense will tell every one to employ only rugged parents from which to raise a progeny. It will also go farther, and present, as material points, the general influence on the offspring of the size, structure and form, the desirableness of quality, the period of ripening, productiveness and acclimation of the parents. In greater or less degree, all these may modify the result. It is stated, and my own observation rather confirms the statement, that quite uniformly the shape of a hybrid, from two equally vigorous plants, will be taken principally from the pistillate variety, while the quality is more directly dependent upon the staminate side. Freedom of bearing, and period of maturity are less uniform, and attributable with less regularity to either parent. Thus, a large, long, and dry late pear, (pistillate,) hybridized by a small obovate and juicy, early pear, (staminate,) would be more likely, I think, to produce a juicy pear of the shape of the first, than a dry pear of the shape of the second; but I should make no calculation as to period. To settle upon any fixed and determinate rules, we need more carefully noted observations. And these the head-work of a skilful manipulator must supply.

But, labor of this kind need not be limited to artificial hybridization. It is desirable to be putting the natural combinations more constantly to the test by raising all practicable products from seeds. Every farmer can well afford to be always carrying forward one experiment, at least, of this kind. I saw in a garden, last spring, a thousand rhubarb plants, to say the least, raised from a single sowing three years before. They occupied but a small space alongside the wall, and nearly every one was better worth raising than nine-tenths of the plants bought at the nurseries—cuttings from giant stocks. But, and this chiefly interested me, there were six or eight plants which were worth all the rest, and which will take their place, as soon as disseminated, among the rarest productions of the day. The stalks were nearly as large as a man's wrist, and as succulent and tender as large.

I have, sometimes, in this light, felt like regarding the disastrous potato rot of 1848, as not altogether so unmixed a

calamity as it at first view appeared. It set men to work, under a mistaken notion, to be sure, but not less salutary because erroneous, of escaping the epidemical scourge by producing new tubers from seeds. The result has been, the introduction to the market of many better and hardier varieties of this esculent.

An experiment similar to the experiment with the rhubarb seedlings, is perfectly practicable with the seeds of the currant bush, which is now almost universally raised from cuttings. And yet, whoever will gather and sow currant seeds, with or without artificial fertilization, will be quite sure to raise, in three years' time, better bushes, with more upright stems and finer heads, than can be raised by slips in the same time; and have the chance beside, of getting one or more plants vastly more valuable than the parent stock. For it is a well-established fact, that high culture is more likely to show itself in the germs which are formed under it, and out of which grow new generations, than in the fruits which are only the capsules of the seeds. Experiments of this kind offer all the promise of the [in]famous gift enterprises of our day, in which, it is said, every one gets his money's worth, in the first instance, while the manager, with philanthropic purpose, will, however, give him a chance of getting a farm, a watch, or a paper of pins. But there is one peculiarity in nature's "gift enterprises," you are sure never to be cheated. Somebody else must indorse the others.

I have thus far limited the statements of agricultural head-work to what may be accounted the manipulations of the craft. But, however interesting and advantageous it may be to add head-work to hand-work in these, such a limitation of the application of the mind's capacity will not open all the mental privileges which belong to the farmer. Gentlemen, it is your place to be very closely in contact with the ways of nature, and out of such a connection with natural phenomena, it would seem as if the farmer might at once, by careful observation and faithful inquiry, derive not only food for reflection, but something to elevate his soul by reverence, to increase his comfort by thrift, and to enlarge his mind by the acquisition of valuable

information. He is often the sport of the elements. He can never be their superior by might, but only by mind.

I do not suppose that the farmer has no rules deduced from observation, and no science peculiar to his calling. But, has he all that will be of benefit? He has received, through a long line of generations, many significant maxims and counsels, which are old enough to be good, to say the least. In Massachusetts, he yet reverently nails an old horse shoe—never a new one—upon his barn, for a well-known purpose; and I believe there is no recorded instance of its failure. He thriftily kills his pig by the almanac, on the increase of the moon. This has not been infallible, for I have heard complaint that the pork shrunk, although the "moon was just right." In philosophy, he is convinced that the moon changes once in an average period of about seven days, seven hours and thirty minutes more than it changes every day in the year, and prospectively arranges his plans accordingly. Here is wisdom, part of which he generously shares with other laborers.

I have no purpose to quarrel with wisdom, let it come whence it may, and in what form. There can be no particular disadvantage, in itself considered, and some good, economically viewed, in nailing a horse shoe on the inside or outside of a barn door; it is surely less likely to be lost, thus secured, than when lying about loose, or only hanging upon a nail. We quote Ben. Franklin, who says, "a penny saved is two earned." Nor do I perceive any objection to butchering on the increase of the moon, if the swine be fat, the weather favorable, the butcher handy, and the farmer at leisure. And, if it will keep up any one's faith in Providence to trust to the changes of the moon for the changes of temperature, it will not prevent a six weeks' drought, which has neglected so many times to break up according to rule at the proper hour, from yielding in the middle of one of these periods, whenever the atmospheric conditions shall become favorable for shower or storm.

Massachusetts, in all the history of her Normal Schools, has had the good fortune to have many able instructors. But one of them, who has now gone to his reward, had for the key note of his instructions, the short, but very comprehensive word, "why." By these three letters, he continually put his pupils upon their own thoughts, and induced them to make such

inquiries as can never fail to give vividness even to clear perceptions, and will often lead to the conviction that what we seem fully to know, we have only half learned. Now this is precisely the spirit in which nature invites us into her school and bids us ponder wisely her secrets; things often placed out of the reach of children, only that they may be fully within the control of adults.

You can scarcely go a step without encountering something which thus needs looking into. You had a larger yield upon a wet field, for this rainy year, than you have generally secured in a dry season; and yet the land has always been accounted too moist for successful culture. Surely, interest, as well as science, will render you curious enough to ask, why.

Last week, you had a severe frost on your low land. But the thermometer stood at 55° when you looked at it before retiring, and at 45° in the early morning, just when the damage was done; and yet you know that water does not freeze with a temperature greater than 32°. Indeed, why was it, that the frost followed its usual law, and avoided the hills and the neighborhood of all your stone walls? Beside, some of your plants were destroyed, and others were unharmed; and they were all of the same kind. Will you be content to say, "that's singular;" or, shall you ask why, and discover the true cause? Moreover, in a thermometer held over the frozen plants, the mercury would have stood several degrees higher than over those untouched. That is decidedly more singular, and the reason is worth finding out for its own sake; and knowing it, you may, perhaps, better guard against the antics of Jack Frost, whose picture painting on the window pane is queer enough, but whose manœuvres in the gardens "beat the Dutch." And yet, they are uniformly all "according to the statutes, in such cases made and provided."

Closely connected with the early frosts of autumn and the late frosts of spring, is a most interesting inquiry concerning *dew*, the foundation of such frosts. Dew, as it is well known, supplies to vegetation much needed moisture in dry weather. Around this will gather at once a host of questions. Why is dew a general indicator of dry weather? And what is its connection with these destructive frosts of New England? And, more beautiful and interesting than all, by what unvary-

ing law does it happen that clover and corn, and other plants most affected by the evaporating power of the sun's rays, are always the quickest to catch the dew in early evening, and seem to gather so large a supply of the moisture which the night gently carries over the earth? These are not accidents. Great laws are not fortuitously beneficent. And such facts are calculated to set a farmer upon a course of observation in summer and of thinking in winter. They will give to the contemplative person ample head-work for many long winter evenings.

It is not, you perceive, for mere idle curiosity that these inquiries are to be pressed; and even supposing no advantage to accrue from the mental discipline, they may redound to the thrift of the life. The farmer is very much at the mercy of the elements. Franklin has told him how to secure his barn from lightning; but there are yet many farmers in this generation too wise to learn of Franklin, and the insurance offices will pay for one-half, at least, when the electricity has kindled a flame which consumes the whole, and forty or fifty tons of uninsured hay, and twenty head of cattle.

Professor Espy, some years ago, published a valuable work on the phenomena of storms, and it was easily travestied by saying that he proposed to manufacture showers to order, in dry seasons. But his book is certainly not the less able and interesting, and valuable, that it contemplates no expedient reaching to such an extent of folly.

The study of such natural phenomena is not calculated to make us independent of nature, but it may oftentimes enable us to take nature at advantage. Without it, we are helpless. The duck knows when to plume her feathers for the shower;—the farmer does not know, half an hour beforehand, when to put a canvas over his half-made hay. An ant builds up her house many hours in advance, to keep off the rain; the farmer, if it happened to rain the day before, is so sure of fair weather that he pulls off the shingles, just in time to soak the inside of the house or barn. How much observation and investigation will do to enable us to escape such results of ignorance, we shall better know when we have tried them.

There is still one direction of strictly scientific investigation which may claim a particular notice. I mean the careful study

of the forms and habits of insect life. It can scarcely have escaped any one's observation that insect life is getting to claim a full share of the products of the soil. Last evening, a neighbor showed me a sample of his potatoes, which are all perforated by the larvæ of the May-beetle. And he very natually inquires how to exterminate them. This is an open field for experiments. They multiply beyond enumeration, and may yet come to be as numerous as once on the river Severn, (1574,) when "so many of them fell into the streams that the water-wheels were stopped by them." Did you ever seek to calculate the annual crop of these beetles? They fly in clouds in the summer evenings, and every pair will annually produce two hundred grubs. And they constitute only a specimen of a most multifarious and multiplying host of destructive insects; in which class we will not include the carnivorous musquito, but for illustration, name the cutworm, the striped bug, the black squash bug, and the squash maggot, which, in regular sequence, seek to exterminate every squash vine.

It would certainly be highly remunerative for every farmer to become acquainted with the habits of insects destructive to vegetation. By experiments, it may be possible to hit upon some remedy, some means of checking the nearer approaches of this invading army. It is, certainly, rather humiliating that such little things can circumvent all the labor and skill of a strong man. And it is quite time that the strong man should set himself to work to circumvent them. But all this seems sadly out of place, when I remember the specimens of caterpillars, which hung, unmolested, in June last, in such rich network clusters upon the denuded trees, and find myself supposing that such a sight may indicate the care which the farmers of Middlesex County are willing to exert in this direction. I do not wish to speak ill of any man, and I do not believe in personal violence; but if any man is to be ridden upon a rail, or to be decorated with tar and feathers, I think one of the most prominent candidates should be the farmer who leaves a caterpillar's nest to ripen to maturity, and its inmates to fly away to "increase and multiply." But verily, if all such are candidates, you may ask me for the electors.

These will suffice for out-door illustrations of what invites the investigation of the husbandman. But in-doors, there are

matters of no less interest and curiosity as well soliciting his thoughts; or, rather, perhaps, the thought of his "better half" and her helping daughters. From the cellar to the attic, there are matters which need a little application of science. Perhaps you have noticed what is the temperature most favorable to preserving apples and potatoes from decaying, and that a tight box has some advantage over an open one; and that when apples keep well, potatoes may not do so; and, *vice versa*. Is it not worth while to know why?

The dairy department is one about as difficult as any, to manage successfully. And there are a good many things about it needing much study. It would be desirable, for instance, to know why milk curdles so rapidly after a tempest; because, if the cause were well known, it might be possible, perchance, to apply a suitable remedy. In like manner, you wish to find out to what the spontaneous acidity of milk is due, and what are the chemical changes which take place, and how they are affected by heat; and, by knowing these, you might very likely hit upon some rational expedient for always keeping the milk sweet until the cream has a chance to rise well upon its surface; this it cannot do in hot weather, because it gets entangled in the caseous formation, or curd of the milk. Then, again, there is something mysterious in the process which converts sweet, rich cream into hard butter or sour whey, or buttermilk; and I should not think much of the mental activity of a dairy maid who did not catch herself, in the midst of the churning, uttering to herself if not aloud, that very significant word, *why*.

Almost every one, now-a-days, knows that the milk-room should have a temperature not exceeding 60°, Fahrenheit, nor below 50°, for the most economical production of cream. But why? And, that at about the same temperature, churning most speedily converts the cream into butter. But why, again? There would be no hap-hazard in managing this department, and no rancid butter thrown into the market, if these troublesome *whys* were suitably answered. Scientific men found out these things long ago, and their books are waiting to tell those who wish to know. But the persons who should be most interested in putting the knowledge into practice, have too much to

do, even in winter, to get it, and butter-making must still go upon chance.

Another department, close to butter, is the bread-making, especially when bakers do not thrive. What say you to a little head-work here, rather than to leave it all to the manipulations of skill. I tell no undiscovered secret in saying that too many pounds of flour find a short cut every year from the barrel to Albee's patent pig-trough! Chemical researches into bread-making have been as thorough and satisfactory as the importance of the matter demands. But why the changes are produced,—why the kneading or stirring must be effectually done, and cannot be slighted,—why the dough's cleaving from the hands is the evidence of its completeness,—why yeast produces several per cent. more nutriment from a hundred pounds of flour than leaven,—why flour, which is good to all appearances yet will not make light, sweet bread, can be made to do so by the addition of a tea-spoonful of sugar to two pounds,—and why carbonate of soda is better than the carbonate of potassa, or saleratus, though both are needless, or worse, when the bread-making is the best; and either may be highly injurious in quantities which leaves it free in the stomach,—why bread, made light by soda and cream of tartar is just the bread for housekeepers, who are behindhand with their family supplies, but never "raised bread," —that good, old-fashioned, honest, nourishing bread of the past —and finally, why the yeast powders, so called, sold by itinerant commercial gentlemen, (yeleped, peddlers,) are almost an indictable fraud upon human well-being,—is, to say the least, worth knowing. Each one of these *whys* has an answering *wherefore;* and I can anticipate the satisfaction it will be to discover any one of them.

While we are in or about the kitchen, it will do no harm to look, for a moment, into the meat pot. If the family is to have soup for dinner, the worthy mother of the young housewife has told her to drop in the meat, and, as far as practicable, the vegetables which are to flavor the liquid, and not to preserve their own form and flavor, separately, while the water is still cold. She told her it would be better to do so; but did she tell her why? Doubtlessly, she reversed the lesson of wisdom, when a joint has been procured to serve the excellent purpose of a boiled dinner; and the why, for this; was that given, too? If not, I

see no security that a lapse of memory may not sometimes leave our young friend in the condition of the damsel, who had an excellent rule by which to tell whether eggs were good or not; she would just place them in a dish of cold water; for if they were good they would certainly float,—or sink; and here memory failed, because the why was not also given.

But, is it worth while to trouble ourselves with the secrets of nature and art, if we can get along quite as well without the labor? I once knew a man, a very lazy fellow, who thought it morally wrong to attempt to find a remedy for canker-worms, as something not meant for man to know! To me, an attempt to measure knowledge by its adaptation to the absolute necessities of eating and drinking has about the same greatness in it. But knowledge quickens intelligence; and intelligence is a good guide in every kind of labor. I hate to see a man using force enough to turn a grist-mill in splitting a log, because an unintelligent or blundering blacksmith has shaped his wedges contrary to the dynamic laws of the inclined plane; or a snow-shoveller spending his strength, needlessly, against the grain of a drift, which has a grain, lying the way of the wind, as much as the trunk of a tree has a grain according to the flow of its sap, in the formation. Intelligence will remove such defects in manual labor. Any thing that whets up the mind also enriches it with new powers and makes the hand-work something more agreeable than before.

* * * * * * * * * * *

Agricultural Head-work: This, the agriculturist wants, not only as the complement of his hand-work, and for its success, but to give dignity and interest to it. In the strife of interests which are competing for preëminence among men, agriculture can stand no equal chance with other industrial enterprises, unless it will take to itself that which gives prominence and success to the others, and that is, mental activity. Taken by themselves, ploughing, planting, tilling and harvesting, are very menial employments, and represent, in their terms, little more than severe drudgery. But let them be combined with great and earnest thoughts, such as relate to the chemistry of the soil, the laws of vegetable physiology, the reasons for atmospherical changes, and the relation of production to human necessity, and you then have science, philosophy, art

and humanity, all tributaries to the granary; and the granary becomes the store-house of ideas, which will bless the world long after this year's produce has been consumed.

But this is but half the influence. The farmer perceives his own mind to expand, and his sphere to be thus enlarged. He comes to occupy, of right, a new place in political economy and in domestic life. He no longer divides his time upon labor, food and sleep; but a fourth demand, greater than the others combined, and making them, also, more profitable, will have its full share; it is *thought*. The power of thinking is a divine gift, by which a man pushes out beyond his acquired knowledge, and seizes great principles and makes them his own; by which ignorance may become enlightened, and an individual, however wisely read in books, may come to know more than he has learned.

It is with the secrets and mysteries of your vocation, quite as much as with its expedients and profits, that thought engages. The hands turn the soil; the mind analyzes its parts. The eye selects and the fingers sow the seed; the mind discovers the elements of fertility which can convert it into a hundred-fold; or weighs the opportunities of making some new combination, out of which greater blessings shall come to the race. And every step in this direction, every new accession of intelligence to the farmer's work, will show itself in the ingatherings of future years. And I give you, in conclusion, as a sentiment worthy of a place in every daily calendar of duty,—Agricultural Head-work: *Not to save the hand-work, but to make it more beneficent, and more in correspondence with the way of Him, who works with unerring intelligence, by the side of the husbandman, for a world's continuous welfare.*

THE AMERICAN FARMER.

From an Address before the Middlesex South Society, Sept. 18, 1856.

BY LEVERETT SALTONSTALL.

I may well congratulate you, farmers, and as a warm admirer of your profession, loving the country and its pursuits, its rich fields and fragrant forests, may express as briefly as possible a few thoughts which have occurred to me, and which, if they are not instructive, will perhaps interest you and tend to suggest food for reflection.

You are the owners as well as the occupiers of the soil you cultivate. You are not burdened with tithes, your taxes are light, and the product of your labors will command more of the necessaries, comforts and innocent luxuries of life, than is the case in any other country in the world. Could you pass over the broad Atlantic, and, landing on the shores of old England, observe with your own eyes the condition of the farmer there, and thence proceeding through France, Italy, Germany, and Spain, once realize the vast difference between your lot and that of the farmer in either of those countries, you would fall on your knees and pour forth thanks to the great Creator that you were born a free American farmer.

You will notice that I have mentioned only those countries which are ranked as the best and freest in Europe. In England the laws of primogeniture, and the division of the people into classes, have concentrated in the hands of the few the whole of the land, so that only one in about four hundred and seventy is a landholder, and seldom, if ever, does the land-owner cultivate his own land. But toiling from dawn till dark on soil, not an inch of which he can expect ever to own, doomed to labor for life without hope of rest, as unable to rise beyond his caste, as he would be to stand erect if buried beneath a mountain, happy is the English laborer if he can save enough to put food, such

as it is, into the mouths of his children, and a rag on their backs.

Yes, of free, slave-hating England, sad to say, tales of misery, of ignorance, and degradation can be told which make us weep. See her wretched miners, in the everlasting night of the collieries, knowing not the meaning of the word air, light, sun—year in and year out, commencing as small children and ending as prematurely old men—fortunate in getting a bare sufficiency to hold body and soul together, and never looking beyond that. Talk to such men of ambition, and tell them to better their lot, and they understand you not. What wonder, when informed that in this blessed land, every man however poor, whether foreign born or not, can own his own farm—that there is no distinction between poor and rich, but that the child of the rich man may to-morrow be destitute and the son of the pauper be a millionaire—that the youngest son is equal in the law, and as a member of society, to the oldest—that, in fine, every man may have the certainty, by diligence, frugality, and virtuous industry, of obtaining a competency—what wonder, I say, that the miserable, half-starved creatures think of America as a paradise, and sacrifice every thing to set foot on these shores.

Let me narrate an anecdote beautifully told by a friend of mine in addressing the farmers of Essex:—

"That you may know something of the Scotch laborer's condition, let me tell you what one, who was once one of them, told me within a month. 'Sir,' said he in reply to my inquiry, 'my food was parritch,—dinna ye ken what that is?—which I prepared in my ain pot over the fire, stirring in the oat-meal for myself, and when it was cooked I dipped it out and ate it,—and this was my food, morning, noon and night,—week in and week out. And I wore corduroy breeches and a corduroy jacket, with a blue bonnet and nought to keep the sun from my e'en. My feet had ne'er a shoe, and so I toiled on till I heard of America. And I just left home and wife and child, and came along, first to Canada, where I almost killed myself chopping down trees,—and then to the United States, where I soon felt that I was a man, the which I had hardly felt before.

"'For my wages, I earned two dollars and a half a week, while at home, I scarce got half of it. I called it a heap of money. The man that hired me put me out to board, and when I saw

the first meal, I thought the folks had made a breakfast party on purpose for me, and were very grand folks, and very extravagant too, for they had hot tea and hot coffee, and hot cakes, and a plenty of good butter, and plenty of meat, which I scarcely ever saw at home ; and I was afraid to sit up to the meal. But they told me to take hold, and I just did so, and I ate and ate till I was all full inside, and could hold no more ; and I have never seen the time from then till now, that I have not fared as well ; and the man that fails in America—God bless her—to get a living, whether he be native or foreign, is just a fool, or too lazy to live.'

" Such were the actual words to me of a once Scotch laborer from near Paisley, who is now worth one hundred thousand dollars,—of which, forty thousand is money at interest. He lives in a western county of Massachusetts. You may call this a strong and rare case ; suppose it be, it shows what can be done under the influence of institutions such as ours."*

I might compare the condition of the American farmer with that of the millions of serfs, the cultivators of the soil in Russia, or with that of the poor oppressed nations of the East, the millions of cultivators of the soil who are mere tenants at sufferance, and may be driven from their homes while their crops are standing ; and who, if by chance they scrape together something more than the bread they eat, literally bury it in the earth, knowing that the bare suspicion of their good fortune would bring ruin upon them and their families. But time will not permit. I have conversed with the men of whom I speak, both in Europe and in the East. I have seen what they call their homes, which you would deem it cruel to call a shelter for your cattle. On some of the fairest portions of this beautiful earth, the only homes of the farming population are of mud and stone ; where, in one apartment, men, women, children, mules, asses, swine and poultry, lie down together, and when the fierce storms or the cold night compelled me to take shelter in these abodes of misery, I found, from what I there heard, saw, and smelt, the whole truth of this sad story. Even in lovely Italy, the most beautiful and fertile country in the world,

* Address delivered at Lawrence, September 30, 1852, before the Essex Agricultural Society, by Henry K. Oliver. pp. 17, 18.

when riding one day in one of the rough vehicles of the country, which was crowded with priests, monks and farmers, a most intelligent man with whom I was conversing, as we drove along the luxuriant banks of the Bay of Naples, told me that he cultivated a certain tract of land,—which appeared to me as he pointed to it on the hill-side, with its orange trees in full fruit and blossom, like the garden of Eden,—that he was obliged to pay *seventy-five per cent.* of all he could make it produce, in his various taxes and rent; that this was certain, and that he would not complain if he could be sure of the remaining twenty-five per cent.; "but, to tell you the truth, Signore Americano," (in a whisper,) "these gentry,"—signifying by various winkings and shruggings of the shoulder, that he meant his clerical friends in the long robes,—"are pretty sure to have their share of that, too."

Starting then from this point as an established fact, that the American farmer is more fortunate than the farmer of other countries, in owning his farm, and in thus having every incentive that can be conceived, to constantly improve it, let us glance at what he has already done, or what has been done for him by modern science, in the way of improvement, and then at what he ought to do, or how he ought farther to avail himself of modern science, if he regards his own interest or his own duty.

The husbandmen of antiquity, as well as those of the middle ages, and even those of a comparatively recent period, were destitute of many advantages enjoyed by the modern cultivator. Neither the practical nor the theoretical agriculturists of those periods had any correct knowledge of geology, mineralogy, chemistry, botany, vegetable physiology or natural philosophy. But these sciences have given the modern farmer command of important agents—elements and principles of which the ancients had no idea; the precepts of their writers were conformable to their experience, but an explanation of the principles on which they prescribed practices, was rarely if ever attempted by them. Nature's most simple modes of operation were to them inexplicable, and their ignorance of causes often led to erroneous calculations with regard to effects.

We have now much knowledge of the nature and properties of manures, mineral, animal and vegetable; of the best modes of applying them, and the particular crops for which particular

sorts of manure are applicable; of the necessity of using all manures of animal origin, unless composted, while fresh, before the sun, rain and air have robbed them of their most valuable properties; of the absurdity of the old method of rotting manure till it is destitute of almost all its fertilizing properties; of the means of chemically analyzing soils to ascertain their constituent parts, and thus learning what is needed to increase their fertility. We have introduced the raising of roots, whether turnips, mangel wurzel or carrots, for feeding the cattle and fertilizing the soil. We substitute fallow crops, such as require the stirring of the soil while growing, in the place of the less profitable naked fallows. We have invented beautiful labor-saving machines,—conspicuous among which are the reapers and mowers; we have discovered the art of breeding the best animals and the best vegetables by a judicious selection of individuals from which to propagate; we have also discovered that peculiar breeds of cattle are peculiarly adapted for certain purposes,—the noble Durhams and Herefords for *beef*, the Ayrshires and Jerseys for the dairy, and the handsome Devons, while partially uniting the qualities of the other three, for draft; and that by adhering to the pure blood we can have a reasonable certainty of these results. We now find that swamp lands, which have heretofore been allowed to remain worse than useless, filled with alders and poisonous vegetation, can, at comparatively little expense, be rendered the most productive portions of our farms, by a judicious system of *draining*, and that by thorough draining, nearly every acre of land can be made to yield double and three-fold its former crops.

These are some of the advantages which science and careful observation have given to you, and which have produced within late years, the most wonderful changes in the system of agriculture. Would that I could say that all farmers had availed themselves of them; but alas, too numerous are those, who, either from prejudice, obstinacy or ignorance, having eyes see not, having ears hear not, or seeing and hearing *believe* not. Practical farmers, they style themselves, as opposed to book-farmers. I should like to place in the hands of all these *practical* men a little volume which I have lately read; it is called "Talpa, or the Chronicles of a Clay Farm." The author of Talpa was a *book-farmer*, and will show more than one of you,

how your acres can be rendered more productive than a mine of California gold. He relates how on a long voyage the only volumes he could find in the cabin, were the Useful Knowledge Society's two volumes on British Husbandry; how he read and re-read them, and became so much fascinated by the subject, that when he reached land, he was given over by the faculty as a professed book-farmer; how he became the owner of a farm in a dismal clayey district, which one tenant after another had left in despair, till it was at last abandoned to its own rushes and sedges, a dreary, marshy waste. He proceeds in a most humorous strain, giving us conversations between himself and his *practical* neighbors, who laughed at him; firstly, for dreaming of making any thing of the old farm; secondly, for his outlandish mode of going to work;—plain men of common sense, they could not understand how any thing good could come of analyzing soils and scientifically repairing mud. "Men, who could not understand these books, and so, 'twas no use trying. A lot of chemistry and stuff—they would back common sense against chemistry, any day." He tells us how he attacked the lion in his den, and laid a system of draining tiles at a depth varying from eighteen inches to three feet; how he subsoiled it, ploughing to the depth of ten or twelve inches. Here is a page of the pleasant little book:—

"'A queer lot, this, sir.' 'Well, it is queer,' replied I, as the drainer threw out first a lump of blue clay, then a lump of red, then a horrible spadeful of *white*, then a dripping mass of yellow sand, then a kind of grey gravelly conglomerate, that had puzzled the very pickaxe whose delicate style of dissection had been brought to bear upon it; then a few spadefuls of beautifully veined red marl, and then broke into a carboniferous looking bed of black peat, and then—but let the old drainer christen it, for my heterology is exhausted. '*A queer lot*, this, sir.' 'What shall I do with it?' I stood for a moment melodramatically silent, working up my courage to a great effort. Out it came at last. '*Let it be spread over the land.*' He was just raising his face to look up in mine. I knew what was coming; I caught one side of his mouth screwing into an agony of contortion, as the idea loomed painfully, by degrees, upon his perceptions. I waited for no more, but turned quietly round,

trying to stifle a fit of inward laughter—not at my own words, but at the effect I knew they were producing—and walked away. I turned once only, and saw him leaning on his spade and looking after me. I can give you his soliloquy, for it was written upon his attitude, like the lettering of a picture. 'Well! If *that* don't beat every thing.' "

And then the author relates his victory—more glorious than any field of Alma, or Balaklava, or Inkermann, for it was a bloodless one. He had redeemed a piece of unproductive land, and had given to the world a fine productive farm, capable of filling hundreds of hungry mouths with the best of food. He finally, in a quiet but humorous strain relates, principally in bits of conversation, his well-won triumph over his practical neighbors, as he pointed to his fields of turnips and golden waving wheat,—not only equal, but superior to those on other farms which were esteemed among the best in the land. I cannot forbear giving you one more page from the little book, before parting with it:—

"Spring came at last; beautiful spring, that fills the old heart with youth, and softens down to a more genial and hopeful tone the frosts and snows that reign within, as without, through dreary winter. Certain reports respecting the field which had been drained, and so curiously 'top-dressed,' had from time to time altered the current of public opinion that hitherto was so strongly all one way. The under-wagoner had told somebody that the snow had disappeared on that field much *sooner than from any other*. This had been repeated in equal confidence from mouth to mouth, with the addition that the clay had 'kicked down to ashes.' But what topped every thing was, that before even bean-sowing had begun, the motley close was reported 'as dry as a bone.' The harrow is certainly not the most ingenious or perfect of agricultural implements; but, never was a more surprising feat performed by any, than was witnessed one fine morning early in March, when it was ordered over the field afore-mentioned. Down went the clay, sand, peat and every thing else—

"Black spirits and white,
Blue spirits and gray,
Mingle, mingle, mingle,
Ye that mingle may."

And mingle in truth they did, into as free, healthy a soil, as fresh and as mellow as if it had never lain underground or been out of the sunshine. With every turn of the horses, better and better it looked and worked. An increasing elasticity of movement seemed to pervade men, horses, harrows, soil, and even the very atmosphere of the field."

So much for Talpa, but let me recommend it to your own perusal. In England and Scotland, you are well aware, there are thousands of acres which but a few years since were fen, bog and heath, now smiling in all the splendor and richness of glorious crops. And there are also thousands of acres which formerly were among the most productive, now yielding so large an increase on their former products by virtue of thorough draining, as to pay in two, and sometimes one crop, the whole cost of drainage. I am well aware you may exclaim, "But England is not New England. Labor costs there but half what it does here; their soil is one thing, ours is another,—their summers are moist, ours are subject to intense and scorching drouths,—and granting that this draining would improve our *swamp* land, it never would answer for our meadows." Or, it may be objected, "land is cheaper here than it is in England—better purchase more land than to throw away money on that we already have; for surely it is better to own an hundred acres than fifty."

To the first objection, I would say, the experiment has been well tried, and the result, so far from bearing an unfavorable comparison with that in England, proves satisfactorily that thorough draining and subsoiling would be beneficial in the highest degree to the larger portion of our land that is now under cultivation, as well as to much that is considered useless for all purposes of husbandry. Appended to the volume before referred to, are two papers written by farmers in the State of New York, who have made very careful experiments and noted the results. One of them says, in reference to soil, situation, &c., "The soil is mostly a loam with a slight mixture of sand and gravel, and in some of the lower places, a portion of mucky or decomposed vegetable surface soil, which has doubtless been formed by the wash of the land around, and which has settled in these places. The land is elevated much above the average of lands in this immediate vicinity, and lies in a

rolling and sloping position,—so much so that my draining operations have caused nearly all who beheld them, to wonder that I should incur so great an expense in draining land which was already—as they thought—quite dry enough. The loam-soil extends to the depth of fifteen or eighteen inches, below which there is uniformly a tenacious or hard-pan subsoil, which is about as impervious to water as an unmixed clay, and when dry is *very hard*, so that in digging the drains, a well-sharpened pickaxe is always necessary, as soon as the surface-soil is removed, which is done with a common spade. The subsoil, after being made loose with a pickaxe, is thrown out with a round-pointed, long-handled shovel; and the ditch is only made wide enough for the operator to work the shovel in, and he, standing one foot before the other in the ditch, plies the shovel, and bearing the forward hand upon the forward knee, as a fulcrum, operates with comparative ease and advantage."

As to the advantages, the same farmer says: "Some of the advantages derived from draining are, that the ground becomes about as dry in two or three days after the frost comes out in the spring, or after a heavy rain, as it would do in as many weeks, before draining; enabling the farmer to work his land at any time he may desire to do so; it also dries it uniformly, all over the field, so that in ploughing, he does not find spots of wet and dry, but all is in good condition at once. It causes the lowest places, which are generally too wet at seed time, and consequently produced but little if any crop, to produce the best of any part of the field, being generally the richest soil, from having had the wash of the surface of the land about it for many years. I will only estimate the increased value of the land by saying that I have the past year made over 1,200 rods, on twenty acres, at a cost of about $25 per acre, and that I should not permit such land to remain without draining, were the expense double."

Next, as to the objection on the score of the expense of labor and the abundance of land in this country. This seems at first, very plausible; but it is a feeble argument and amounts to nothing. If you possess an acre of land, is it more profitable to cultivate it, or let it lie in a state of nature? The answer will be, to cultivate it. And if so, is it not better to cultivate it well; that is, to enrich it carefully, and with due regard to

the nature of the soil and the crops you plant; to observe a careful rotation, in order that the next year's crop may receive the benefit of those elements in the soil and the manure which were not required this year, that nothing may be wasted and the land kept constantly productive? This will be readily granted. Now if it can be demonstrated to a mathematical certainty, that by subsoiling and thorough draining, you receive fifty or one hundred per cent. on your expenditure, and that the improvement is not for one year only, but for all time, will you not turn up the under-soil of your acre to the vivifying influence of sun, rain and air, and lay your drains, that the water may percolate, carrying with it the air to heat, ventilate and fertilize, and that the roots may strike deep instead of spreading themselves on the surface, where they are susceptible to all the baneful changes in the atmosphere, especially to drouth; that your acre patch may become dry and warm in two days after the frost comes out, and that you may plant it weeks before your neighbor?

Now, if this is true of one acre, why not of twenty, fifty, an hundred? If one acre can be made to yield a profit of twenty per cent., why not make the remaining forty-nine do the same? If one acre can be made to produce seventy-five bushels of corn, why should not the whole farm be brought up to the same standard? You will exclaim, "This is gardening—not farming!" I care not what term you apply to this mode of cultivation, but if gardening a small patch is vastly profitable, why not garden more? If a man can support his family on an acre or two thus treated, what might not you do with your fifty?

You will again object, we cannot afford this expenditure. But, do you not find money enough to buy a little railroad stock —a bond or so—which generally depreciates in value? How much wiser to plant your money in your land, and to see it, every two or three years, doubling itself. The mistake farmers make, in my humble judgment, is in considering money thus appropriated an *expenditure*, whereas it is an *investment* of the most productive nature.

If you have no money to make these improvements, why not part with half your superfluous, poorly cultivated acres, and produce more with the remaining portion than you ever did with the whole?

If there is any truth in books, (and what are books on agriculture but a series of the most careful experiments with their results accurately noted?) farmers would thus advance their own interest, do their country a service, and I doubt not, in every way improve their own character. Truly, it is a pitiful thing to see one of your anti-book, anti-improvement farmers, with his many acres poorly tilled and poorly fenced; with his old shaky barn, the wind whistling through its ample cracks and knot-holes; with his cattle, their coats rough and staring, covered with their own dung, looking half-perished with the cold; vainly endeavoring, with scant labor and poor, exhausted manure, robbed of all its fertilizing qualities by long exposure to sun, wind and rain, to make the old farm produce even as much as it did in his good father's time; with his corn patch always a corn patch, and his mowing land always mowing land; with, it is most probable, a mortgage on the old place which he is vainly endeavoring to discharge,—when you know what your "common-sense, practical, anti-book friend could do, were he once thoroughly convinced that 'there are more things in heaven and earth than are dreamed of in his philosophy.'"

But, perhaps he will not part with any of his ancestral acres. Well, I honor him for the feeling. He who cannot part with a thing because it was his father's, who will not sell an inch of the old farm on which he was born, *cannot* be a bad man. On the contrary, he must be, and you will always find him virtuous, kind and honorable. To him I would say, take a few bushels of acorns, walnuts and chestnuts, and plant them over your superfluous acres. It will not cost much, and your children will thank you for doing it.

Have you ever considered how our forests are vanishing before the ravenous steam-horse and the ship-builder, and calculated how long it would take to despoil New England of this, her most ornamental as well as useful feature, so that it will not be recognized by our children as the same land they read of, as known to their fathers? It is a sad thought that our lovely groves and magnificent forests, that every old oak which has served as a land-mark for generations, all are falling before the power of money? "A tree in full leaf," says Lord Bacon, "is a nobler object than a king in his coronation robes."

I would then appeal to you not only to be less wasteful of

the forest trees, but also to plant them. Our best timber is becoming more and more costly; our civil and naval architects are obliged to make use of inferior quality; the live-oak of the South is becoming more scarce; our apparently inexhaustible stores of white pine and white oak are rapidly disappearing, while there is no real effort to save them or supply their place. You, each one, who owns a few acres, can do your share in arresting this mighty evil, and by a simultaneous effort, at the expense to each of only a few dollars and a few hours of interesting labor, can confer a vast favor upon your children at a cheap rate. The forests are to America one of the chief jewels in her coronet—skirting our lakes, shading our rivers with their exquisitely varied foliage; covering our hill-sides, they not only appeal to our sentiment of beauty and of the picturesque, but protect the springs and sources of our invaluable rivers, and save them—as they merrily dance over their rapids on their way to the sea, founding cities on their devious course—from the too fervid rays of the summer sun. We ought to remember that our rivers, unlike the Rhine, the Danube, or the Rhone, which spring from the everlasting snows and giant glaciers of the Alps, trace their sources back to the small springs and petty rivulets which owe their very existence to the protecting shade of the forests.

I remember that riding one hot summer day in the south of Spain, whose plains and hill-sides have been thoroughly denuded of trees—except of the poor, homely and shadeless olive—my intelligent guide pointed to a huge ring or bolt in the side of a rock, as our horses were picking their way through the dry, rocky course of a once deep river. "There," said he, "the old Romans used to make fast their galleys when they ascended this river." The forests have now gone, and with them this once navigable river, which flows only in the winter, and then is but a shallow stream.

SCIENCES APPLICABLE TO FARMING.

From an Address before the Hampshire Agricultural Society, Oct. 10, 1856.

BY EDWARD HITCHCOCK.

There are three sciences in particular, from which it has been supposed agriculture might derive important benefit, viz.: Botany, Geology and Chemistry.

It is obvious now, that these branches open before the scientific man a wide and most interesting field. And within a few years past, most diligently has it been explored. Some of the ablest chemists, geologists and botanists of Europe and America, have been most actively and successfully employed in these researches.

As a consequence, the science of agriculture has advanced most rapidly. Even a review of its progress is more than I can attempt on this occasion. But I ask your patience while I briefly notice the most important points that have been gained, and the present aspect and prospects of agricultural science.

Whoever examines the internal structure of plants, even cursorily, will be struck with its analogy to that of animals. He will find in both, organs for the reception of food, for its digestion and assimilation, as well as a system of circulation and reproduction. The plant, indeed, has its peculiarities of organization, as for instance, that no nervous system has been discovered in it; and yet it seems possessed of irritability, if not sensibility. Under the microscope, however, it is a wonderful structure; and notwithstanding all the difficulties of the investigation, the patience of physiological botanists has disclosed an organization in plants almost as wonderful as that of animals.

To the chemist it has long been manifest, that the true way to ascertain what food is needed by plants, is to analyze their whole substance, to see what ingredients they contain. For the notion prevalent not long since, that vegetables have the power

to transmute one simple substance into another, is utterly exploded; and no scientific man now expects to find in plants any ingredient that does not exist in the soil or the atmosphere. The uniform result of careful and repeated analysis of plants is, that they are mainly and essentially composed of four principles, viz.: carbon, oxygen, hydrogen and nitrogen. These are combined together in various ways, and form the almost entire mass of vegetables. But when plants are burnt, they leave a solid residuum, or ash, which often contains eight or nine other simple substances, viz.: chlorine, iodine, sulphur, phosphorus, potassium, sodium, calcium, magnesium, aluminum, silicon, iron and manganese. These are the inorganic ingredients; and though essential to the composition of plants, they do not always exist in the same proportions, even in the same plant, as do the organic ingredients,—that is, carbon, oxygen, hydrogen and nitrogen. Neither are any of these ingredients, organic or inorganic, found in a simple state, but are united in various ways.

The next grand inquiry is, Whence do plants derive their twelve or thirteen ingredients? If we can answer this question satisfactorily, we have gained an important step in ascertaining how the farmer can supply food to those plants which he cultivates. As a general answer to the question, we may say, that the soil and the atmosphere are the only sources whence the vegetable world can derive its nourishment. And analysis shows that, ordinarily, all that is essential to its healthy development is found there. Indeed, nearly or quite all of these ingredients are usually found in the soil; and the common impression is, that the greater part of the substance of plants is derived from the soil, by means of the sap absorbed by the roots, because it is necessary to add manure yearly to render soils productive. But the opinion is now general among chemists, and seems sustained by facts, that a large proportion,—say about two-thirds,—of the carbon contained in plants, is absorbed directly from the atmosphere by their leaves. And yet only $\frac{1}{2500}$th part of the atmosphere is carbonic acid, which is diffused through the whole air, and less than one-third of this gas is carbon. How then can a tree or forest, for instance, obtain enough of this gas to form so large a part of its substance? since the quantity immediately around it, and even the fresh portions brought by the

wind, must soon be exhausted. But here a very wonderful law of nature completely provides for the difficulty. If several sorts of gas or air be brought together, even though some be much heavier than others, they will soon become equally mixed throughout; and if any one of them be removed from a particular spot, what remains of the same gas in other portions of the mixture will instantly expand, till it has filled the whole space, just as it would do if that were the only gas present. So that, if all the carbonic acid around a particular plant be absorbed, the gas will rush in from other parts of the atmosphere, and thus keep a constant supply within reach. In this way a tree can go on without interruption, except by winter, accumulating carbon for years, and even centuries. A single pine tree in Oregon, for instance, is sometimes found to contain 256,000 pounds of carbon; which required 1,305,333 pounds of carbonic acid; two-thirds of which is 870,222 pounds, all taken from the atmosphere; or 800 pounds yearly, on the supposition that the tree required 1,100 years for its growth. This single example will give some idea of the magnitude of the process that is going on, silently, yet surely, to supply all the forests on the globe.

So much for the carbon which forms the principal part of the solid portion of the plant. Whence does it obtain its oxygen and hydrogen? Nearly all of it, no doubt, from the water pumped up by the roots, or absorbed by the leaves; for water is entirely composed of these two elements. Nitrogen, also, the least abundant ingredient, might, it would seem, be derived directly from the air by absorption, since four-fifths of the atmosphere consist of it; but there is no evidence of any such absorption. Yet a small quantity of it is absorbed by the water taken up by the roots. Ammonia, also, a compound of nitrogen and hydrogen, sometimes exists in small quantity in the air, and is produced still more abundantly by fermenting manures. Nitric acid, likewise, is sometimes found in minute quantity in the atmosphere, and its absorption would furnish nitrogen as well as oxygen.

As to the inorganic matter of plants, the sulphur, phosphorus, lime, silex, iron, manganese, &c., it must nearly all be derived from the soil, since water alone can hold it in solution. Chlorine perhaps may, as Dr. Dana suggests, be derived from the

atmosphere in the condition of common salt, which he has shown to exist probably in the air.

Such are the ordinary sources whence the food of the vegetable world is derived. But there is one principle of vegetable physiology of great importance and deep philosophical interest, that should be noticed, since its neglect has been a fruitful source of controversy among scientific men. It cannot be doubted that plants, like animals, have the power of adapting themselves to circumstances; so that, if they cannot obtain nourishment from one source, they are able to derive it from another. It is well known that some plants will flourish in pure water, others suspended in the air; and on some marly soils, destitute of vegetable matter, abundant crops may be raised without manure through an indefinite number of years; though in all these cases, probably, plants are less robust and prolific than if supplied with food both from the soil and the air. But their ability to draw a less perfect subsistence from different sources is another interesting evidence of Divine foresight and benevolence.

Chemists have not been satisfied with ascertaining the nature and origin of the nutriment of vegetable nature. They have attempted to follow the crude materials through their various and most delicate metamorphoses, till they become converted into the different remarkable compounds which plants produce. And though much of the chemistry of these changes is concealed, yet we can see what are the most important agents concerned; and heat, light, and electricity, stand at the head of the list. It can hardly be doubted that the rootlets of plants have the power, by a galvanic agency, of eliminating from the soil many important principles, not otherwise separable; nor is it more doubtful that the various products of plants are the result of a similar galvanic agency exerted by their organs. The necessity of heat for effecting these various changes has always been known; but it is not till recently that the necessity of light, and its mode of action, were understood. The sap, it appears, undergoes but little change till it reaches the leaves. There it experiences digestion, by the action of solar light upon the green matter, called *chlorophylle*. The green matter itself is first produced, and then it forms an apparatus by which the compounds in the sap are decomposed, the oxygen gas is liber-

ated, and mineral or inorganic matter becomes organized, that is, converted into the various parts of the plant. The chemist cannot, indeed, look into all the crucibles and flasks which nature employs in this curious laboratory, nor examine all the reagents, because they are too minute; but he can see enough to show that the whole is a chemical process, modified somewhat by the vital principle.

He can see enough to make him strongly desire to see more; enough to make him feel how infinitely superior is nature's chemistry to his own.

The analysis of the various parts and products of plants has disclosed some most curious facts as to their great similarity, and their relation to the principles found in animals. It has been ascertained that animals need two sorts of food; one kind containing nitrogen, and another sort destitute of it. Those principles containing nitrogen are necessary for their nourishment, such as *albumen*, *fibrine*, *hæmatin* and *caseine*, which are the same essentially in composition. Those principles destitute of nitrogen are necessary to sustain the process of breathing, and thus to furnish fuel for keeping up the animal heat. These are fat, starch, sugar, gum, &c. Now these principles, both for giving nutrition and keeping up the animal heat, often exist ready formed in vegetables, and when vegetables are taken for food, the animal merely appropriates the principles. Thus fat exists in the oily and waxy parts of vegetables; starch and sugar occur abundantly in many plants; and the fibrine, albumen and caseine, are derived from the gluten of flour, the leguminous principle of beans, &c. It needs nothing, also, but water and the oxygen of the air, to convert these various principles into one another; and sometimes this can be done even by man. Thus, starch is easily changed into sugar, and very palatable bread has been made out of wood, which, in fact, is chiefly fibrine, and contains all that is essential for nourishment. Who knows how soon it may happen, that a few cords of wood shall furnish the poor man not only with fuel but with bread?

These theories of nutrition and animal heat cannot be regarded as completely established. But they are so much more ingenious and satisfactory than any which have preceded them, as to give them strong claims upon our attention.

Geology teaches us that soils are nothing but rocks crushed

into powder, and mixed up with vegetable or animal matter. Hence we might expect that they would differ in composition as the rocks differ, and so they do; though such has been the nature of the agency by which the rocks were crumbled down, that the materials from several rocks are frequently mingled together. But in fact, rocks do not differ very materially in composition. Some, such as trap rock and limestone, contain more lime and magnesia than others. But there is scarcely any rock of much extent, that does not contain all the earthly ingredients essential to plants; and therefore, so far as their composition is concerned, it is comparatively unimportant from what rock a soil is derived. We shall be almost sure to find in it a large amount of silex, more or less of alumina, lime and magnesia, with gypsum and phosphate of lime.

But the great difference in the fertility of soils depends more upon the amount and condition of the organic matter which they contain, and upon their power of absorbing and retaining heat and moisture, and upon their degree of fineness or coarseness, than upon their mineral constitution. Every farmer knows that a soil may be too coarse or too fine for good crops, and that it may be too cold; and also that it may abound in organic matter,—that is, such as results from decayed animals and vegetables,—and yet be very barren. And when ashes, or quick lime, or marl, or gypsum, or bone powder is added, they render the soil fertile, not because the soil is entirely destitute of these materials, but because they bring the vegetable matter into such a state that it can be taken up by the roots of plants; or they make it mellow, or more tenacious of heat or moisture.

If these views are correct, some important consequences follow.

One is, that there is scarcely any soil too barren to be made very fertile; and that what the farmers of New England should aim at, is, not to transplant their sons to the fertile prairies of the West, but to improve our own soil, so that they shall be contented with the paternal inheritance. To illustrate this position, let me give an example from my own experience. Every one knows that there is not a more barren spot in New England, than the further extremity of Cape Cod; where the traveller sees little else but white drifting sand, and scarcely no vegetation, except a few stinted pines, and beach, and poverty

grass. Finding myself in Truro, and, as I fancied, almost beyond the regions of agriculture, I was surprised, on being invited by a respectable farmer there, to visit a piece of ground on which he was in the habit of raising annually fifty bushels of Indian corn to the acre. I found that the soil did not differ from the white sand around it, except in containing an abundance of fragments of quahaug shells, and enough of organic matter to give it a dark color. Having extracted these shells, that is, all the carbonate of lime, (about 20 per cent.,) and a little phosphate, and then burnt off the organic matter, nothing remained but the pure white sand of the Cape.

Now this is an extreme case; and if such a soil can be made fertile, I know of none in New England that cannot be made so. True, it requires industry, ingenuity and perseverance. But this is just what men need for the development of a good character, and for happiness. Providence never conferred a greater blessing upon this nation, than by directing our Pilgrim Fathers to the comparatively barren shores of New England. Had they found an easy and naturally fertile soil here, New England character, in which we so much glory, would never have been developed. It needed a soil capable, by cultivation, of yielding a good return, but not affording even subsistence without untiring industry and skill. We ought, therefore, to be thankful for the comparative barrenness of our soil, and instead of envying others their naturally richer fields, we ought to be stimulated to make ours as rich as possible by cultivation; and then we shall have, what is very seldom acquired in regions that yield almost a spontaneous growth, and what is worth infinitely more than natural fertility; I mean industrious and sober habits, well-informed minds, energy of character and a good conscience. And this, with me, is one of the strongest arguments for doing all we can, to sustain agricultural societies, since they are accomplishing this work in a most energetic and efficient manner.

Perhaps science has not thrown more light upon any part of agriculture, than upon that of the nature and operation of manures. It is but a few years since there was a darkness that might be felt, upon this subject. But now, we know the composition and specific action of most substances called manures. They may be divided into two classes; the first embracing the

various salts useful upon land, and the other, consisting of vegetable or animal matter mixed with salts. The salts are such as common salt, nitre, phosphate of lime, or bone ashes, limestone, marl, nitrate of lime, potash, soda, &c. These, in their pure state, do not afford much nutriment to plants, but they act upon the nutriment, and prepare it for the organs of the plant, by rendering it soluble and decomposing it. The common manures, or a large part of them, are converted, when mixed with the soil, into what is called geine, or humus. But this is not in a proper state to be taken up by the roots, until acted upon by other substances, when it becomes soluble, or produces carbonic acid. Common manures usually contain more or less of the salts; but, being most of them soluble, they are carried away by rains, and hence the value of new supplies. Nor does it usually require but a small quantity, as the example of ashes, and gypsum, and phosphate of lime, evinced. The latter, in the state of bone dust, where the phosphate is mixed with carbonate of lime and cartilage, is a manure so concentrated that one ton of it is equal to fourteen tons of farmyard manure; and almost equally concentrated is guano, and some other compounds now used upon land. But I cannot go into details.

Allow me also to repeat a suggestion made in my report on the Agricultural Geology of Massachusetts, respecting the use of what I call *muck sand*, dug from a considerable depth in the earth. It is well known to the chemist, that most of the salts, so useful upon land, are dissolved by rains, and carried downwards through the soil, till they meet with a water-bearing stratum. There they will accumulate; and now, let that stratum—known by springs issuing from it—be dug up and spread over the surface, and these salts will exert their appropriate influence upon the crops. This very principle is the chief secret of the good effects of subsoil ploughing, and I doubt not but it will yet lead to valuable results in the use of substances drawn from a still greater depth. In some instances, they certainly have produced astonishing effects.

Though I have doubtless wearied your patience, ladies and gentlemen of the society, by these details, I would gladly add more. But I trust I have said enough to show how important a bearing science has upon practical agriculture. The day I

trust has gone by, certainly among the enlightened farmers of this great valley, when men reject and treat contemptuously what has been called *book farming;* by which I understand farming on scientific principles. Such farming has done too much, both in Europe and this country, to be any longer despised, or even looked upon with scepticism. The many agricultural societies, on both sides of the Atlantic, so prolific of good, are based upon science, and would be almost useless without it; and the numerous journals of agriculture now published, derive their chief and most valuable matter from the applications of science to cultivation. Indeed, it is scientific agriculture that enables twenty millions of people to subsist in Great Britain on the same soil, which in 1780, sustained only nine millions. The Highland Agricultural Society, in Scotland, especially, has done wonders, when we consider that no country is more bleak and barren in Europe; yet it now has reached a very high state of agricultural prosperity, and chiefly through the influence of that society, now seventy-six years old. The average produce of wheat in the whole of Great Britain was formerly but nine bushels to the acre; but it is now more than nineteen bushels, and in several counties of England and Scotland, the average is not less than fifty bushels.

"On the continent," says a traveller, "especially in Germany, their annual fairs bring together the farmers and peasants of all the surrounding country, when their ambition and industry are stimulated by a variety of fetes and the distribution of prizes to successful competitors; and whilst princes, dukes and barons are engaged in awarding prizes to those who have been most successful in the cultivation of grains and cattle, their lovely wives are occupied in a humble but much more lovely scene, in complimenting and distributing premiums to the industrious housewife, for her fine specimens of fruit, her butter and cheese, her linen clothes, weaving, knitting and other manufactures. I have no doubt I shall be ridiculed for my want of taste, when I state, that to me the Grand Duchess of Baden, presenting a silver cup to a peasant girl, before an assembled crowd of farmers and nobility, for the finest specimen of manufactured gloves, was a more interesting sight than that of the gay Queen Victoria, racing through St. James's Park,

with fifty fools at her heels, striving not to be distanced by their lovely mistress." *

In this country, we are beginning to realize similar fruits from enlightened agriculture, under the fostering care of agricultural societies. Many a noble farm in New England, with its produce doubled or trebled within a few years, testifies to their influence. Our farmers have been fearful that they could not compete with the products of the West and South, poured in upon them through the great iron sluice-ways that steam has forced open. But let them unite Yankee industry and perseverance to scientific agriculture, and I will put them against the world. The more railroads we have, the better; for they will only bring the market nearer. Instead of discouraging the farmer, they should stimulate him to seize upon and apply all the principles of science and experience to improve the cultivation of the soil. Why, for instance, should not the almost entire surface of New England exhibit as high a state of cultivation as we now witness around most of our villages? The soil is capable of it; nay, of much higher cultivation—capable of sustaining four times its present population; and thus, if our morals and religion be preserved, of giving us four times more influence upon the world. I trust that the next generation will see this statement verified; and that, too, as the fruit of two things of which some are very much afraid, viz.: railroads and book farming.

* Southern Cabinet for January, 1840. p. 4.

EDUCATED FARM LABOR.

From an Address before the Hampden Society, Oct. 3, 1856

BY OLIVER MARCY.

You, the farmers of Hampden County, have a great, a good, a vital object to secure. How will you secure it? I answer, the only possible way is by educated labor applied to the soil. I do not mean that to farm profitably, a man must be educated in Latin and Greek, but in *farming*, for farming is a science of the most comprehensive character, and though the most ancient, the least developed of all sciences. But here I encounter a doubt among you. "Book learning is worth nothing," say you. "Any man that knows any thing may know how to farm," and "education won't pay." Education will pay,—the more intelligent the laborer, the more profitable the labor.

Sir Charles Lyell, some dozen years since, in giving a description of a Lowell factory and its operatives, states that he wishes his English readers distinctly to understand, that the stockholders made a good profit, else they might be tempted to infer from his description, that the operatives were only gentlemen and ladies, playing at factory. These operatives are chiefly young women, educated in the common schools of Vermont and New Hampshire, and the mills which they operate compete successfully with similar establishments of England, though the English manufacturer pays but half the wages for his uneducated help.

American vessels, commanded by captains and mates, raised in intelligent New England society, and educated in our free schools, command not only higher rates of freight, but in all the ports of the world are preferred by importers and exporters, at these higher rates, to the vessels of any other nation. That the cause of this is the superior education of our commanders and men, we have the opinion of Englishmen themselves.

Educated labor not only pays the manufacturer and the ship owner, but it pays the farmer also.

There is a tract in the town of Wilbraham on which the farmers of the last generation could not obtain a living, though they seemed willing to live poorly. They did not even raise the rye which they ate. This they obtained by going to other parts of the town, reaping rye by the day, and taking their pay in the grain which they reaped. Now that tract is occupied by some of the wealthiest farmers in the town, and they have made their money from the soil which they occupy. That soil *now* grows *rye*—and it grows any thing else that grows in the town. I need not tell you that the present occupants of that tract of country have been active members of your society from its commencement. I am informed that twenty-five years ago, two-thirds of the farms of Ludlow did not pay the current expenses of their occupants, and their expenses then were not so great as the current expenses of the occupants now; but instead of the heavy mortgages that then existed, now there is money to let. What is the cause of the change? Cause, sirs, there is cause enough. Beside the temperance reformation, to which, no doubt, they owe something, a flood of light and knowledge has been poured in upon them from the agricultural press and from agricultural fairs. And if any are there who do not take the papers, and who do not attend the fairs, still, the light from their neighbors' farms has shone in upon them, and dispelled the darkness in which they would willingly grope.

Enough has been done to show that agricultural education is profitable. But is it perfect? Have the farmers in Springfield, and Longmeadow, and Westfield, got their farms into the most profitable condition? Nay; very few farmers will assert they even know how to do so. The science of farming at present, consists of a mass of heterogeneous and disjointed facts. What is known must be arranged into system before it can be greatly available, and through that system the unknown will be brought to light and become known. In this age of learning, every trade has become a profession. No man can hope for success, unless he understand the science of his business. He may shovel and hoe, and perform other labor of mere brute force, but he cannot manage a farm to profit, unless he understand the reason of things. To do this, he must be as well

educated in farming as the professor of mathematics, or the professor of chemistry, or of Latin, need be in their departments. Nay, the farmer's education should be superior. The science of farming includes something of many other sciences, and is therefore very complex. The farmer should know enough of geology to comprehend the character of the rock from which his soil is derived. He should know enough of chemistry to understand the decompositions and recompositions that are taking place in his soil and in his fertilizers. He should know enough of botany to understand descriptions of the grasses and grains which he cultivates, and the weeds that infest his farm. Situated as the farmer is, in the midst of phenomena, his success depending upon guiding phenomena aright, he must have the power of observation and reason highly cultivated, else he will fail to observe results or refer his observations to wrong causes.

If this is to be the high character of the farmer's education in the future, I need not ask pardon in speaking of the soil of the country, the *first* thing which you must study, and the thing which you must *always* study for giving you its geological history. The divine must read church history—the history of the Arian, Socinian, Calvinistic and Armenian controversies before you allow him to go into your pulpits. The lawyer must read Greek, Latin and English laws, he must read decisions of our courts, he must know how and when the writ of *habeas corpus*, trial by jury, and that great mass of unwritten principles, called common law, came into existence—how they have affected society, before you admit him to the bar. The physician, too, must study the history of diseases, the modes of their treatment, and the elements of the Materia Medica from the great Hippocrates to the present day, before you admit him into your families. The soil has a history as well as medicine, or divinity, or law, and the farmer who would labor with success, must study it. In no other way can the excellent report of your State surveyor, Dr. Hitchcock, be understood and made profitable to those for whom it was written—the farmers of Massachusetts. According to his classification, the soils of the valley are chiefly alluvium, diluvium, sandstone and mica slate, or gneiss. Where are they located, and what is their character,

are questions we propose to answer by this history, and if you pronounce it a fable, please learn the moral.

Many scientific men believe that there was once a time when the earth in the vicinity of our meridian, as every where else, was like the surface of a cooling smelter's furnace. There was a crust around a central fiery mass, made porous by the evolution of gases through the semi-fluid cooling lava. It was blistered and corrugated and thrown into hills of considerable dimensions, for the moon in that early day as now, had power over the earth, and in her daily rounds dragged after her a tide which broke up the solid shell, and formed it into floating islands. The molten surge heaved island upon island, and dashed high up their rocky sides, and in dripping back, cooled in stalactical forms and in congealed cascades. Thus the fragments became thickened and cemented together, and the crust roughened by hills and hollows became more permanent. But water existing in a state of vapor, having been driven by heat from the central mass, coming in contact with the cold of the outer spaces, was condensed and fell in showers upon the still almost incandescent crust. Then was hissing, and steaming, and cracking, and crumbling of the brittle, barren cinders into loose debris, while the water itself went off in whirling clouds of steam, carrying with it the heat of the central mass to the cold spaces, and condensing, performed the same evolutions again.

When the crust became so cooled that the water was permitted to remain upon its surface, it washed the loose fragments from their resting places and strewed them in the bottoms of the valleys, and over the extensive submarine plains between distant mountain coasts. These beds of sediment, pressed by the weight of the superincumbent ocean, prevented the heat from radiating from the subjacent crust, and thus, by the inner fires, the crust was remelted and the sediment recrystalized and formed into solid rock.

When these, in their turn, were elevated by the forces now deep pent up within the earth, higher hills, larger mountains, more lofty cliffs, and steeper precipices were formed. Then were formed Washington, and Jefferson, and Ascutney, and Monadnock, and Hoosack, and the range beyond Westfield, and the hills that run through Palmer and Monson, on to meet

the Sound. These are the primary stratified rocks, the gneiss and the mica slates.

When these hills were elevated, the valley of the Connecticut River was formed. This was an immense trough, especially that part between the ocean and the north line of Massachusetts. The bottom was at least 14,000 feet* below the present soil, and the hills, on either side, lifted their crags two or three hundred feet above their present summits. And all over Vermont and New Hampshire, instead of the round-topped hills that now exist, there were towering pinnacles, jagged cliffs and shelving precipices.

These cliffs were worn and decomposed by the rain, battered by the hail, split into fragments by the frosts and the lightnings, and the fragments were washed down into the valley bottom, by the streams. The great trough gradually filled up, while the hills were rounded, smoothed and lowered. Long Island had not yet appeared, and the tidal wave rolling in unbroken from the open sea, laved the base of our hills from New Haven to Northfield, and strewed the sediment over its shallowing bottom.

How long this day continued, we do not know, but this we know, that it continued long enough for things of life to appear, both in the sea and on the land. Enormous birds were there, whose weight was a thousand pounds; whose feet were half a yard long, and whose stride was equal to two paces of a man. They congregated together like cranes upon the shore, waded the shallow waters, and left the prints of their feet in the mud, which, turning to stone, has so perfectly preserved them, that we can see the papillæ upon the skin of their toes.

Dr. Hitchcock has described the tracks of at least fifty species, varying in length from one-half an inch to twenty inches. The greater part of them were made by bipeds, most of them, probably, by birds. But, at least a dozen were made by quadrupeds, most of which had hind feet much larger than the fore feet, like the kangaroo, king of these animals; and walking among them upon two feet, was a monster with structure like a frog, but huge as an elephant.

* See History of Western Massachusetts, vol. 1, p. 386–7; written by Dr. Edward Hitchcock, Jr., Williston Sem. At Gill Falls it was 10,000 feet deep. —President Hitchcock.

Ages passed on, and these animals lived undisturbed, basking themselves in the sun that shone upon no human being, cropping the herbage of the shore, or seizing the fish of the estuary; but though no one was there to rule them, no one to name, describe and classify them, they left a record of themselves in their tracks which has been better preserved than will be the books of Audubon or Cuvier.

There was another epoch—when the gravel and sand, and mud, which had filled the deep cavity, and between the layers of which these animals had left their tracks, and some of them their bones, had become changed to rock, then again the pent up fires burst the shell about them—new rock and all, for seventy miles all along the valley, and through the crevices, oozed the red semi-fluid lava, cooling as it arose, till it produced Norwattuck, and Holyoke, and Tom, and their train of lesser notables, extending on to West Rock, New Haven. None but brute animals were there to witness the eruption, and possibly they did not survive the catastrophe, for the force that rent the solid earth for seventy miles, produced a destructive quaking far and near. All over the valley, the new rocks which were before in a horizontal position, were thrown into hills and hollows. In some places, at least, the valley sunk, leaving the fragments of the younger rock which jutted against the older hills, high up on their sides, in the place where they were deposited. This deposited rock is called sandstone, and underlies all your farms in the valley, from the range on the east to the older range on the west.

There was another day. Not a day of fire, as heretofore, but a day of floods, of cold, of ice, of death. From the north pole to South Carolina, there extended one enormous mass of ice. It was five thousand feet thick, filling every valley, and riding above every mountain top. Mount Washington alone lifted his naked head above the frozen surface—a lonely isle in the great ice ocean. And there rested that mass of ice, like a chill death-moth, over all these fair lands. Life was extinct; no tree or shrub, no fish, or fowl, could bloom, or swim, or fly—all were dead.

This sea of ice, sensitive to the varying heat of the sun, expanded and contracted, and with its motion and enormous weight, pulverized the subjacent stone and rocks, broke off cliffs

and ground down the hills. And when the ice-king lost his hold and the southern portion melted away, icebergs broke loose from their mountain moorings, and floating away southward, bore with them rocks and stones, and dropped them along the valleys and on the hill-tops. And the moving waters swept on the fine sand, the gravel, and the rounded pebbles, and formed an immense bed of loose material all over this valley.

The sand and gravel at the bottom of the moving waters, was thrown into banks and bars, and hollows, like the snow driven by the wind, and the retiring waters left lakes and ponds, pent up in their cavities. Some soon broke through their sandy barriers, some only after ages had passed away, and some still remain. This great bed of loose material, modified by the retiring waters and the flowing streams, has been called, by those who classify your soil, diluvium.

Now commenced the more immediate preparation of the valley for the residence of man, the formation of the alluvium. Under the influence of a genial sun, the peat moss started in the muddy lake—fish were created in the now transparent waters, lichens grew upon the rocks, and *these* dying, mingled their decomposing fragments with the sand, forming a soil for larger plants, which, in their turn, came into existence. Then were created animals feeding upon these plants, then those which preyed upon each other, and all, plants and animals, when they had fulfilled the first object of their creation, dropping their organic remains upon the bosom of mother earth, mingled their elements with the soil and prepared it for more luxuriant growths. The maple, the chestnut, and the oak came to cover the hills, and the pines stood thick over the plains. Then man appeared and built his hut and made the plant, the fish, the beast, all contribute to his happiness. But, it is not only said in Holy Writ, "In the sweat of thy face shalt thou eat bread," but the soils teach us that the labor of the head and the labor of the hand must be expended upon them before they will contribute very much to the production of human happiness. God has given us heads and hands, and placed before us rock, and sand, and clay, and mud, and marl, and peat, and says unto us, "work."

The soils, as a general principle, are derived from the rocks that underlie them, and are therefore of the same chemical

composition as those rocks. The gneiss and the mica slate which compose the hills that skirt this valley, contain a simple mineral, called feldspar. This feldspar contains more potash than wood ashes, bushel for bushel. When the rock therefore is decomposed and the potash set free, you have, in the soil that is formed, an important element of fertility. Upon this soil grow the grasses, forming a beautiful green turf and affording fine pasturage. There, too, the dicotyledonous forest trees, the chestnut, the sugar maple and the oak luxuriate, seeming to live, sometimes, upon the solid rocks themselves, their little radicles decomposing them and abstracting the earthly elements of their stems and leaves. There, too, grow the best apples and peaches in the country.

Through the midst of the valley there are, here and there, ridges of sandstone which existed previous to the diluvial period. Over these, the rushing waters swept the loose material which found a resting place at lower levels. The soils derived from the decomposition of these rocks are very valuable, and though the early settlers passed by these and cultivated the soils of the older rocks on the higher hills, they are now made very productive.

The fertility of the soil depends much upon the fineness to which it is reduced, and the degree of chemical decomposition its elements have undergone. Many of the diluvial plains, therefore, strewed with fine sediment, are quite fertile, while acres of land, stone and gravel, exist almost as destitute of organic matter as in the day when they were washed into their present position. But even here, there is silica for the rye stalks, and phosphate of lime for the kernel, and the least organic matter will enable the germinating rye to attain such a size that the roots will perform the decomposition for themselves.

In the laboratory we form a soluble glass by mixing two parts of potash with one of sand; this soluble glass is a large ingredient of the stalk, the leaf and the glume of the corn, or rye, or grass. If, then, you plant a hill of corn upon the sand, and throw a handful of ashes upon it, and let the heavens drop their showers upon it, the roots will form the same glass, take it into its circulation, and fix it in the growing stem. The pine will flourish on these soils, but other trees, especially fruit trees,

grow with reluctance. Here is a field for scientific effort. Despair not—ashes and decomposed peat and clay, if you can get them, will do much. You may yet see the turf growing on these soils as thick and green as that which now covers the hill-sides.

The alluviums are the gold mines of our country. They are deposits of peat and swamp mud, and the soils along the river bottoms, which are sands and clays, mingled by the agency of the streams, with the organic matter that has grown upon their shores. Pure organic matter will not grow the finer grasses, nor the grains which we cultivate. But spread it upon your diluviums, or your diluviums upon that, and clover, corn, oats, any thing valuable, will grow upon the mixture. There are two hundred thousand cords of peat and meadow mud in the town of Wilbraham* alone, which could be spared with advantage from the places which it now occupies, and there are hundreds of of acres almost barren lands in the county waiting for its reception. But there it lies—no muck rake touches it. It don't pay its owners a dime. Some don't know that it exists; others don't believe it has any value.

Gentlemen: you may think you understand your own resources better than I do, but I venture to assert that many of you have the means of coining dollars upon your farms, and you do not know that you possess them; or, you have so little faith in what you ought to *know*, you will not risk even a hundred dollars in experiment. I know a meadow cut into two parts by a ditch; on the one side it grows two tons of hay to the acre, on the other it grows nothing but shrubby potentillas, and the man who owns the potentillas does not think it will pay to improve his part of the meadow. He dare not trust his own eyes.

Gentlemen: I would remind you of the fact, that you have charged yourselves with the important duty of developing the agricultural resources of this county. How are you to do it? How will you cause the laboring hand to be always guided by intelligence? Annual fairs do something—they must be con-

* In the State Report of the Geology of Massachusetts, no mention is made of peat in any town of Hampden County, except Longmeadow. A minute survey of each town would add much to the resources known to exist. See Geol. Rep., vol. 1, pp. 144–5.

tinued—but they do not do enough. They only serve to diffuse among you the knowledge any one of you may possess. Patronize agricultural papers; you must do that, but they only diffuse knowledge already possessed. It is *your* business to *create* knowledge. The resources of the county are in her soils. Have you any statistical information concerning these soils? Do you know how much of the land of this county is cropped from year to year without manure, and the crops carried off? And do you know where it is done? Do you know how much, and where the land is, that will grow only a crop of rye once in two years? Do you know how much, and where the peat and meadow mud are, to fertilize that land? Do you know the amount of the agricultural produce per cultivated acre, in different parts of the county, on the different soils? Do you know the amount of stock that can be kept, per acre, in the different towns in the county, and on the different soils of those towns? Do you know how many able-bodied, native men, whose ages are between twenty-one and fifty, are at work on the farms in the county? If you do not know these things, how do you know whether you make any improvement or not, from year to year? How do you know what are the weak and what are the strong points in your resources? How do you know to what to direct the energies of the association—for what to offer your premiums?* All this knowledge can be obtained without expense, probably, by a simple arrangement of town and district committees. But there are farmers who can afford to pay hundreds of dollars for a good report upon these facts, for the publicity it would give to the resources of their farms, and the increased cash value of their farms in consequence.

But some one hears me, who will go away saying, "All this knowledge will do me no good. It will not make corn grow, nor fat the cattle." Sir, I think you are mistaken. But I do not address you. I address a body of men who look for their own good through the good of the whole. Such knowledge will pay any inhabitant of the county, in the general rise of the

* There is no way of presenting truth of this kind but by statistics. The statesman who reckons without them, "reckons without his host." The tradesman can make no sure calculation upon supply and demand without his figures, and any man who proposes to act, ought to know, in definite terms, what is to done.

value of real estate—in the accumulation of property in the county—in the appropriations made by the holders of this property for churches, schools and school-houses, highways and public works.

No scientific man thinks of doing any thing in mineralogy, botany, or entomology, without a cabinet; and yet, scientific as agriculturists claim and are admitted to be, other than the collection in the State of New York, I know not that there is an agricultural cabinet in the United States. In prosecuting your object, the value of such a cabinet, accessible to the members of your society, would be immense.

There are eighteen varieties of winter wheat, and nine varieties of spring wheat, that are cultivated, besides twenty-three varieties not worth cultivating.* Do you know these varieties? or are you dependent upon the word of the seller for the kind of seed you sow, and consequently the value of your crops? The seller, probably, knows no more about the intrinsic value of the seed than you do, and cares much less. You should have specimens of the seed, both in the ear and out of the ear. These specimens should be authentic—the pedigree, the product per acre, and weight per bushel, should be recorded; and then you should demand that the seed you purchase compares with the standard,† otherwise, not knowing your seed, how can you look forward with confidence to the crops.

What is true of wheat, is equally true of corn, of rye, of barley. There are different varieties of these, cultivated in different parts of the State, and even on different farms in the same town. These varieties frequently have very different productive values. The best should be selected as standards, by men whose knowledge and experience render them competent to do so. The grasses should be in your cabinet, with their

* See New York State Agricultural Rep., by E. Emmons, Williams College.

† Suppose the cabinet be connected with your agricultural store, your merchant would become skilled in varieties as he could not be without a cabinet, and as it would be almost impossible for any private farmer to become. Purchasers, then, would have the protection of his superior knowledge. At your fairs, too, you would have men able to give correct names to the varieties presented, and to these persons all specimens should be referred for naming. The farmer brings frequently a traditional name that originated, he knows not where, his article is labeled with the name he brings, and every one who reads is taught an error.

botanical and common names, with their nutritive and productive values. Very few or none of the farmers of the county have made the grasses a study. They know too little of their natures and relative values. Some species are not recognized by the same name in different parts of the county; some species are not distinguished from other species when they are distinct in their nature and values. And I fear there are some farmers among us who have learned so little of the alphabet of farming, that they will be troubled to give you the common name, even of more than three or four of the most common kinds of grasses. They could learn them in your cabinet. Potatoes of the various kinds; onions, turnips, apples, peaches, pears, every thing that the farmer raises, should be there, with their names, weights and productive power recorded. To these might be added specimens of rocks and soils. It should be a cabinet to be studied—not a cabinet of curiosities. Monstrous growths, which excite newspaper paragraphs, give little instruction. It is the normal plant in a well developed condition, whose like *you* may hope to produce, that you should study.

But I will not elaborate the idea further. The intelligent will see, without my illustrations, that an agricultural cabinet will be greatly useful to such students as every agricultural freeholder should be.

THE STATE FARM.

From an Address before the Franklin Agricultural Society, Oct. 2, 1856.

BY C. L. FLINT.

I propose to speak to you of the operations of the Board of Agriculture, as connected with the management of the State Farm at Westboro', in which you as farmers, and all the citizens of the Commonwealth, have a direct interest.

But first I will state, as briefly as possible, what the Board has already accomplished, and is daily accomplishing, in the fulfilment of the legitimate objects of its creation, for the management of the State Farm was not originally contemplated as a part of its objects or duties.

The Board of Agriculture is not a corporate body or society, but a Department of the Government, organized like any other department, with his Excellency the Governor for the time being, as its head. It is composed, mainly, of farmers, and wholly of men chosen by and to represent farmers, with the exception of the Governor, Lt. Governor and Secretary of State, who are members by virtue of their office, and three others appointed by the Governor and Council, whose terms of service continue three years, one of the three being changed or reappointed each year. Each of the regularly incorporated agricultural societies receiving the bounty of the State, has the power of choosing one member of the Board, whose term of service also continues three years. At present there are twenty-one of these societies, and of course when the Board is full there are twenty-one members chosen by the farmers themselves, three holding their offices by appointment, and three *ex officio*.

From the manner in which the Board is constituted you will perceive, that it must naturally form a pretty fair representation of all varieties of agricultural knowledge in the State. A majority of the members selected by the societies, made up as

these associations are, of the most intelligent practical farmers and friends of the farming interest among us, will always be likely to be plain, practical, intelligent farmers, while it would be strange if there were not a larger or smaller number of those who would commonly, though undeservedly, be called fancy or amateur farmers, and some men of scientific attainment. This, it seems to me, is just as it should be. All these classes actually exist, and they should all be represented in the Board, that their various opinions may be compared with each other, and subjected to the test of the common sense and sound judgment which we may reasonably expect to find in a body chosen in the manner described. In this way we may gather from every source all the good which is to be found.

In the convention of farmers* which met at the State House in 1851, and out of which the Board of Agriculture originally grew, it was resolved: "That, inasmuch as agriculture is the chief occupation of her citizens, the Commonwealth, in the organization of its government, should be provided with a department of agriculture, with offices commensurate with the importance of the duties to be discharged, of the abilities to be required, and of the labors to be performed."

The Act establishing the Board was passed in 1852, and the present Secretary entered upon the duties of his office in February, 1853. It may seem hardly proper for him to speak of the manner in which these duties have been performed, yet every farmer should know their nature and extent, and on this account I trust I may be allowed to speak freely without incurring the imputation of arrogating to myself more credit than fairly belongs to me. I should add here, that whatever I have done has been done by the advice and with the approbation and concurrence of the Board, after careful deliberation both on their part and mine, and if any good shall be found to have resulted from our united efforts, the members of the Board should receive their full meed of approbation for it.

In the first place, the law which establishes the Board requires, that "all the duties of the Secretary of the Commonwealth, relating to the returns of the agricultural societies,

* This convention was originally suggested and called by the officers of the Norfolk County Agricultural Society, and its deliberations were included in the State Abstract of 1851.

shall be performed by the Secretary of the Board of Agriculture." In the year 1845, a law was passed, requiring the Secretary of State to prepare an annual *Abstract* of the Returns of the county societies. But the Secretary of State was very rarely a man specially interested in the subject, besides which innumerable other duties made it impossible for him to do this work himself. Hence it was done out of his office, and the Commonwealth was charged with the extra service, and this arrangement continued down to the time of the establishment of the Board. The volume was, substantially, a reprint of the County Transactions, the different reports being but little condensed. When the Board of Agriculture undertook the preparation of the volume for 1853, an entirely new system was adopted, the material was arranged according to subjects, thus bringing together all the statements and experiments in all parts of the State, making the whole far more convenient for reference, and more interesting and useful, while a complete index was added at the end, increasing the value and usefulness of the volume many fold. A new feature was also added to the volumes, with but little expense to the State, in the shape of illustrations of animals and farm buildings; and I might quote innumerable letters from farmers in other States, and appeal to the universal testimony of the agricultural press to show, that it is inferior in interest and value to no similar State publication in the country. But few can know the amount of labor required to make up such a volume from the materials usually furnished, and bestow the proper degree of attention on its publication. I speak within the bounds of truth when I say, that the preparation of this work for 1853, and the annual report to the legislature, which forms a part of it, together with necessary office duties and correspondence, required, on an average, fourteen hours a day of close and severe application, from November to May; and the subsequent volumes have received nearly the same care and time, including the necessary labor in the preparation of copy, the correction of proof sheets and the constant and careful supervision of the printing.

But in addition to this abstract the law requires an annual report of the Board of Agriculture, and these reports are to be prepared by the Secretary. I have labored to make them of interest and of immediate practical value to the farmers of the

State. It is but justice to myself to say, that, though the expectations of the community, at the time of the establishment of the Board, had been raised to such an unreasonable height, that no human efforts could possibly satisfy them, the plan adopted in the reports has commended itself to the good judgment of those who understand best the wants of the farming community. This plan was to take up some particular topic on which the community desired information and discuss it in the most complete and thorough manner, bringing together a mass of information which was not elsewhere available to the farmer.

In my first report, for example, among many other topics of general interest, including a sketch of the past history of our agriculture down to the present time, and a vast amount of statistical information in regard to its present condition, I entered upon the subject of the cultivation of cranberries, which at that time was beginning to excite considerable interest in some parts of the State. On account of the little attention which had previously been paid to the subject, information as to the natural history of the plant was difficult of access to those who wished for it. In the preparation of that part of the report, I visited many plantations; in all, more than a hundred acres of cultivated cranberries, in different parts of the State, seeking information from every source. I thus brought together a greater amount of scientific and practical information in regard to that particular crop, than had ever before been collected. I feel that I may make this statement with some degree of confidence, since I gave the subject a most thorough and searching investigation. That part of the report, and many others, were copied, and quoted, and circulated through the country from Maine to Georgia, sometimes with credit to the farmers of Massachusetts, but often without. I have learned from reliable sources of information, that many acres have been cultivated with cranberries in this State, which would not have been so treated but for the stimulus given by that report, and the cultivators are now receiving the most liberal rewards for their labor.

I mention this only as an example of the plan, which, after very mature consideration, and with a full knowledge of the whole field of labor, it was thought best at first to adopt, and of the good effects which have followed from it.

The Board of Agriculture have also labored to systematize

the returns of the county societies, and have so far succeeded as to be able to show at a glance the financial condition of each, to what objects its encouragement is extended, how much has been paid for any specific object throughout the State, how generally the bounty is distributed, and how much is paid in each town in the society's limits, or in other words, how far the influence of each society extends, and whether it has become localized, thus failing to meet the objects the legislature had in view, or is doing its work well and profitably. Thus the Board obtains the most minute details in regard to the distribution of the bounty of the Commonwealth,—a thing which was never even attempted, to such an extent, before the adoption of the present system. When it is recollected that this bounty now exceeds the sum of eleven thousand dollars every year, no one, I think, can fail to see the vast importance of what has already been done in this respect, and the great good which may be anticipated hereafter from the perfection of the system. All these details appear in the annual reports already alluded to, and are within the reach of every farmer in the State.

Another, and a very important part of the labors of the office, is the judicious distribution of the agricultural publications of the State. This work has been performed with far greater care within the past four years, than ever before. One who has had no experience in similar cases, would think this to be a very simple and easy matter, and it would indeed require but very little time or attention merely to send them broadcast over the Commonwealth; but to distribute them judiciously, to put them every where into hands where they will accomplish a good purpose, and stimulate those who have hitherto taken but little interest in the improvement of their lands, and thus to make their good effects felt and seen in the whole aspect of the State, is a very different thing, and requires no little care and anxious thought. Many hundred volumes are sent each year into the distant towns which often have no representative in the legislature, and no express, and put directly into the hands of those who will use them as a means of improvement. I might give extracts from many letters received from different parts of the State, to show what good has come from this part of the labors of the Board; but it is enough for me to remark in this place, that the object proposed in the distribution of these works

is to put them where they will do most good—to disseminate useful and reliable information among the farmers and others who desire it, all over the State. Nor can it be said, as it sometimes has been, with any justice or truth, that the distribution is partial or incomplete, for any farmer in the Commonwealth who is interested enough in the subject to send to my office, through his representative to the legislature, or otherwise, can procure a copy of all these publications, the only question asked being, whether he is a farmer and resides in this State.

The Board of Agriculture have also distributed many hundred volumes of the Patent Office Report on Agriculture, and many thousand packages of seeds, of which some were received through the Patent Office, and others imported directly from abroad. It is designed to make the distribution of these and similar publications, and seeds, much more general and systematical hereafter, when more convenient office accommodations will admit of it. I need not enlarge on the great good which may be accomplished in this way, both by the diffusion of useful knowledge, and the introduction of superior varieties of vegetables, fruits and grains.

Much attention has also been paid to the establishment of an exchange of agricultural documents with the other States of the Union, which publish volumes similar to our own. Copies of their reports have been, and are thus regularly procured for town libraries, and the libraries of county agricultural societies, and farmers' clubs, and hundreds of volumes placed within the reach of our people. An exchange of documents with the governments of foreign countries, has also been instituted. At the same time, great labor has been devoted to the formation of an Agricultural Museum, in connection with the office of the Secretary of the Board, at the State House; some hundred specimens of grasses, &c., having been already collected. It is proposed to bring together specimens of all varieties of grains, grasses and other plants in the State; every kind of birds, insects and fishes, and every variety of soil, together with mineralogical and geological specimens from different parts of the Commonwealth. Models of the different species of all our fruits are also to be procured, and each is to be labeled with its proper name, and the local names by which it is known in various parts of the State, the soil on which it flourishes best,

and other items of interest and value. In short, it is designed to make a collection which shall afford a perfect representation of all the agricultural products of the State, and be of direct practical value to all who desire to avail themselves of it. A very considerable collection has already been made, but on account of the failure of the last legislature to grant a trifling sum asked for the purpose of furnishing the room intended for its reception, with cases and other suitable fixtures, the number of specimens is not so large as it would otherwise have been, and they are not yet ready for exhibition. But there can be no question of their exceeding and practical value. It is but a few days since a very intelligent, practical farmer came in to examine the grasses. We could show him nearly every variety which grows in the State, and he confessed he had never before fully understood the difference between fowl meadow and blue joint. This is only an illustration of the good which may be effected by this museum, for every farmer in the State can know where to send to obtain any information he may desire, as to any plant of whose name or properties he is ignorant. Such a museum, moreover, would tend to elevate the Commonwealth very much in the the opinion of all enlightened men, be a source of just pride to the people, and the centre of attraction at the State House.

Some idea may be formed of the office correspondence necessary for the attainment of these objects,—grown up almost entirely within the last three years, and constantly increasing,—when it is said that there are already on file over fifteen hundred letters received, while a much larger number has been written, copies of all of which are taken and preserved for future reference. During the time I have been in office, I have travelled over thirty thousand miles by railway alone, on the business of the Board, in attendance on fairs, farmers' clubs and associations, to and from the State Farm, &c.

The mere enumeration of these duties would seem to be enough to satisfy any reasonable man who desired to know what the Board was about. We have labored quietly and unostentatiously, but hard and constantly, confident that the farmers of the State would appreciate well-meant and well-directed efforts to promote the progress of agriculture. I need hardly call your attention to the fact that the members of the Board do not

receive one cent for their time or their service. These are freely given to the public; and for this reason, if no other, they deserve the generous coöperation and confidence of every farmer in the State.

The course which has been explained, was, in my judgment, the best and most efficient that could be adopted. It has been the means of accomplishing more good, and has secured the confidence and respect of the people to a far greater extent than any other could have done. I leave the decision upon its merits, to the good judgment of sensible men. One thing, however, should be constantly borne in mind—the Board have been fully organized and in action only a little more than three years. Much of their time has necessarily been spent in devising and arranging systems and methods of action, and setting in motion the instrumentalities by which they are to accomplish their end. The result of their labors,—though already plainly visible in the increased interest in the subject, manifested in various ways, and especially in the constantly increasing duties and correspondence of the office,—must arise slowly, and will be more and more visible hereafter.

The Board of Agriculture has charge also of the State Farm at Westborough. This is a farm of two hundred and eighty-five acres, lying contiguous to the State Reform School. It was under the management of the trustees of that institution previous to its transfer to the Board in 1854. The trustees desired that this transfer should take place. Being appointed mainly with reference to their fitness to take the guardianship of the large number of boys at the institution under their charge, and not from any peculiar knowledge of farming possessed by them, they found that the proper management of so large a farm required far more attention than ought to be expected from any unpaid board of trustees. The Board of Agriculture, on the other hand, desired facilities for conducting experiments, on a small scale, by which they hoped to add something to our present stock of knowledge of farming, and to meet, in some degree, the wants of the farming community. Certainly there was nothing fanciful in this. It was not intended to turn the whole place into an experimental farm, or a model farm, or any thing of the kind. The design was to manage the farm in a plain, practical, farmer-like manner, and

to subject only a small part of it to experiments of various kinds, which could be conducted there without expense to the Commonwealth, though some of them were of such a nature as to be beyond the means of individual enterprise. Under the influence of these considerations, both the trustees and the Board of Agriculture signed a petition to the legislature of 1854, to transfer the farm into the hands of the Board, and to appropriate the sum of six thousand dollars for permanent improvements and to meet the current expenses of the farm. This was the sum which in the opinion of the trustees would be required to make what permanent improvements were then greatly needed, and of this sum, over four thousand dollars were devoted to such improvements.

It is not necessary for me to enter into all the details of the management of the farm, explaining how we hire of the institution one hundred and fifty boys, for six hours each day, to work on the farm, where they are taught the daily routine of farm labor; how we purchase of the institution all the food for from seventy-five to one hundred swine, and supply it in return with milk, vegetables, and other farm products; and do with our teams much of the teaming for the institution, keeping a debt and credit account for the sake of knowing how we stand, though as both the institution and the Board of Agriculture are children of the State, it matters not in point of economy on which side the balance is. I wish every farmer could go there and examine for himself. I know he would be satisfied and convinced that the farm was well managed. I know he would see no signs of extravagance or injudicious expenditure incurred since the Board took charge of it. Yet the Board has had to contend with prejudice, misrepresentation and falsehood, which, springing originally from the smallest and most insignificant channel, soon winged its way from lip to lip, gathering strength by exaggeration, till it seriously embarrassed the successful prosecution of a truly noble, practicable and judicious public enterprise.

It has been said that the trustees of the State Reform School did not cordially approve the arrangement, and this statement has at times been diligently circulated by the enemies of the school and the farm. It is totally false, and has not the slightest foundation in fact, every member of the board of trustees being

fully satisfied so far as known, that the farm was judiciously and properly managed.* It was also said by those who had never spent an hour on the farm, and did not know what they asserted, that the Board were extravagant in their expenditure. This assertion was based on the cost of a certain building commonly called a piggery. The building called the piggery, cost a little over two thousand dollars. It was built in 1854, when lumber and labor were exceedingly high, and on that account did actually cost some two or three hundred dollars more than it would have in any ordinary year. But what is it? It is a slaughter house, a store house, and a piggery combined. Nearly all the beef and pork for the institution is slaughtered there, and it was connected with the piggery for the sake of economy

* It must be evident that the Board of Agriculture can have no personal or interested motives in the management of the farm, since they are not paid even for the time and labor they devote to it. Whatever appropriation is made, is devoted exclusively to the uses and improvements of the farm, and these improvements are for the permanent advantage and benefit of the State. The confidence of the trustees of the State Reform School in the present management is expressed in the following "memorial" prepared and presented to the late legislature, without the solicitation, but in aid of the petition of the Board of Agriculture, for the usual appropriation.

To the Senate and House of Representatives, in General Court assembled:

The subscribers, Trustees of the State Reform School for Boys, respectfully represent that two years have elapsed since the State Farm at Westboro' was, by authority of the legislature, transferred to the State Board of Agriculture: that the two Boards have acted in entire harmony: that the farm is better cared for by the Board of Agriculture than it could be by any board of trustees not appointed with special reference to their interest in agriculture: that the charge of the farm, in addition to the care of this large institution, could not conveniently or reasonably be assumed by the trustees: and in our judgment, the sum annually appropriated for the farm will be more judiciously expended by the Board of Agriculture, than by the trustees: and we respectfully pray that the appropriation asked for by the Board of Agriculture may be granted.

And as in duty bound your petitioners will ever pray.

(Signed) J. H. W. PAGE.
GARDINER HOWLAND SHAW.
HARVEY DODGE.
THOS. A. GREEN.
HENRY W. CUSHMAN.
JOHN A. FITCH.
PARLEY HAMMOND.

Westboro', April 8, 1856.

of labor in the care of the offal. When the contract and transfer of the farm was made, it was agreed that the Board should remove the swill from the institution, and allow a fixed sum annually for it; and the quantity of food thus obtained enables the farm to support over seventy swine, and during some parts of the present season the number has exceeded one hundred, without the necessity of buying or feeding much grain. The piggery is substantially built and simply and conveniently arranged, though not large enough for the wants of the farm. I believe it to be true that there are few thrifty farmers in the State who have not piggeries which cost as much in proportion to the number of swine they keep, as that at the State Farm, especially when the cost of the slaughter and store house is deducted from the aggregate amount, as it must be if we would get the true cost of the piggery itself.

Nor do I believe there is a sensible farmer here who would not say it was proper and requisite that the farm should have buildings creditable to the State, cost what they might; and even supposing they were a little better than would be necessary on an ordinary farm, it is to be considered that the State Farm is a place of resort for thousands every year, both from different parts of our own State and from other States, and they naturally expect to find a farm commensurate in some degree with the importance of its objects and the dignity and wealth of the State! You, as farmers, would not desire an institution which would do credit neither to you nor to the State. With this slight exception, I know of no items on which a shadow of complaint has been or could be founded; and this was seized upon by the opponents of this enterprise, not because it was justly open to the charge of extravagance, for they did not even examine the items, knowing full well that they could not put a finger on one and show it to be injudicious, under the circumstances, but simply to cast an undeserved slur upon the whole arrangement.

I do not hesitate to say that, in my judgment, the arrangement is one of true economy to the Commonwealth in every point of view. There are some considerations which should not be forgotten in discussing the present condition of the State Farm and its management by the Board of Agriculture. It is perhaps the case that property under the control of a number of

persons, even if they are sincerely anxious to make the most of it, is generally more expensive and less productive than where the whole power is lodged in a single individual, who is the sole owner and on the economical management of which his prosperity depends. There is not so much feeling of personal responsibility, nor so much freedom and readiness of action. If there is to be consultation, conference and comparing of opinions before any step is taken, as there must be where the decision is to be made by a body of men and not by a single individual, time will be lost and delay will follow frequently, until the favorable moment has passed and the thing to be done has either become impossible or can only be done at greater expense and to less advantage than at first.

A familiar example of this principle may be found in the history of many of our leading railroad, manufacturing and other corporations. I refer, of course, only to those instances where there has been no defalcation or illegitimate application of the funds of the corporation. The boards of directors in such companies are generally made up of men who own more or less stock themselves, and hence have a personal interest in a thrifty and economical management of the property. Yet you all know,—too many of you, I doubt not, by sad experience,—how seldom the directors of a corporation, even when they are themselves deeply interested in its success, regulate its affairs as judiciously as a prudent and sagacious individual would. This, I suppose, must in a great measure be the effect of the causes I have before alluded to,—the difficulty of bringing a number of men to act with vigor and quickness, and the absence of a feeling of personal responsibility, on the part of each individual.

But it should be remembered that the object of the State, when it made arrangements for the management of the farm, were not precisely the same as an individual proposes to himself in a similar case. When a farmer buys a piece of land and undertakes to cultivate it, he starts with a determination, generally, of making it as profitable as possible in a pecuniary point of view. If he be a man of large and liberal ideas, if he be *truly economical*, he will not grudge some expenditure on his fields which may at first be unproductive, if it will afterwards make a good return. Still his main object will always be, personal pecuniary profit. If, after a few years have passed, he

finds that the course he has been pursuing has not been profitable to him, he will change it at once. He has only his own interest to consult, and his only end is and should be, to seek that interest in the way by which he is most likely to attain it. But it is not precisely so with the State Farm.

Nor is the reasoning with reference to the general management of corporate property of any force here, since in no case would the State Farm be managed by an individual owner, it having been purchased, in part at least, by the fund established by the benevolent founder of the State Reform School.

The true question then to be considered in this connection, is whether the Board of Agriculture have managed the State Farm as well as could reasonably be expected, under all the circumstances of the case; not whether it has been managed as well and in the same way that his own land would have been by a sagacious and prudent man. Is it not better, in other words, to manage a particular portion of State property in the shape of a farm, by a body of men pronounced by the farmers of the State to be thoroughly competent, selected by themselves to act for and to represent them, than by a body of men appointed without any reference to skill in farming and for an object entirely distinct? I think no impartial legislator can doubt for a moment what answer should be given to the question.

Of the experiments on the farm, I have not time to speak at length, without wearying your patience. They are, as it were, just begun, and no one should expect the most valuable results the first year, or even the second, or the third; but if we may judge from present appearances, we shall at last arrive at facts of great value. I can only allude briefly to the experiments on stock, which have been carried on by a committee appointed for the purpose, with the utmost care and faithfulness for more than a year.

More than twenty cows were taken for experiment, and all were treated in the same manner. Names were given to all, and the age of each, and the time that had elapsed after calving, were noted. An account was kept of the weight of each animal morning and night, at the beginning and end of the trial, and of the exact quantity of food consumed. The daily yield of milk for twenty days was also accurately weighed and measured, and the percentage of milk on the weight, and all other items

of importance were recorded. Then a different regimen was adopted for twenty days, and again another, and another for the same length of time, the same accurate account being always kept.

In this way, the cost of food being known, the exact cost of the milk per pound and per gallon, under each system of diet, was obtained to the smallest fraction, thus giving some data from which the relative advantage of different kinds of food may be inferred. But that is not all. It was the intention of the committee to procure good specimens of the different breeds, subject them all to precisely similar treatment in every respect, and thus, after a proper number of trials, to arrive at the comparative value of each and the relative value of each for the various uses of New England farming, for labor and for the production of milk, butter and beef. As yet, only the Jerseys, the Herefords and the Devons, and the common stock of the country are well represented, the refusal of the last legislature to make the appropriation asked for, having made it impossible to procure others, though contracts had already been made for fine specimens of Durhams on the most favorable terms.

As I was an eye-witness of the exceeding faithfulness with which the committee conducted and still conduct these trials, I can vouch for their being worthy of all confidence, and perfectly reliable. No place could be better fitted for the purpose than the State Farm. The cost to the Commonwealth has been but trifling, and is not likely to become great, since a certain number of cows must, in any event, be kept, and it matters comparatively little to what family they belong, so far as their ability to supply the institution with milk is concerned. The Jerseys were all presented to the Board, to be kept at that farm, and cost the State nothing. Two Herefords, a cow and heifer, were bought by the committee at a cost, for both, of two hundred and ninety dollars. One of them, immediately after, obtained the award of the first prize of one hundred dollars, at the National Fair in Boston, last fall, and a month or two after dropped a calf for which the Board has been offered, and could take to-day, three hundred dollars. The most of the cows, about twenty-five in number, are either of no known breed or grade Ayrshires. The actual cost to the State of these experi-

ments is in reality nothing more than the additional care and attention they require to secure perfect accuracy, and this is an item almost too insignificant to be taken into account. Nor are the experiments on the field more expensive. They require some time and careful observation to secure accuracy, but apart from this, their cost is nothing. This year we have had seventy-six acres under cultivation, and of course, in order to cultivate properly so large a space, all of which is necessary to meet the wants of the institution, some manures must be bought. We cannot make quite enough for the place with the stock which the farm can keep. Hence it makes very little difference, so far as expense to the State is concerned, whether one acre of corn is cultivated with barnyard manure, the next with guano, the next with super-phosphate, the next with poudrette, and the next with muriate of lime, or whether they are all dressed with barnyard manure, guano or super-phosphate. It is only the difference in the cost of the different kinds of manure, and the risk of procuring a few bushels less of good sound corn from some one or more of these few acres where the concentrated manure was used, which is to be considered.

Now perhaps there is some one here who is ready to say that these manures are all "new fangled notions" and worse than useless. Well, perhaps they are, and whether they are or not, is the very thing we are trying to find out. If they are so, we shall be honest enough to tell you; for every experiment is detailed in the Report of the Board of Agriculture, which every farmer in the State can procure free of cost, in the manner already indicated.

But no sensible man would be so unreasonable as to suppose one trial could prove any thing satisfactorily, or two, or three. Most of them are of such a nature as to require repetition. A series of experiments is what we want. We want unimpeachable facts, and we cannot rely on facts which are supported only by the result of a single experiment. When we get a sufficient number of facts, we, as farmers, can draw our own deductions to suit our particular soil and circumstances. Now I say such a series of experiments as are conducted by disinterested men at the State Farm, if their results could be put into the hands of every farmer in the Commonwealth, would be worth millions of dollars to the State.

Let us now consider for a moment the actual cost in money of the State Farm—though time would fail me to compare it with other expenditures, which to say the least, are of doubtful utility. How much per cent. do you suppose the appropraition asked for the State Farm, but not granted, would have added to the State tax for the year 1856? *Just one-millionth part of one per cent.*, and no more. The whole amount appropriated for payment to the county agricultural societies, for the Board of Agriculture, and the State Farm, put together, would make a tax of less than thirty-three-millionths per cent. If a man were taxed on an estate valued at five thousand dollars, he would pay but sixteen and one-half cents for all these agricultural objects together.

In conclusion, I desire to present only one other view. The State Farm must be conducted some way or other, and its expenses must be be borne by the State. If the Board of Agriculture do not manage it, the Trustees of the State Reform School must. Great improvements are necessary to enlarge and develop its capacities, that it may be able to meet the wants of the School; and if the sum required for the purpose is not furnished to the Board it must be added to the amount appropriated for the School. The question, then, is not whether there shall be an appropriation, but merely to whom it shall be made and by whom expended. I think no one who can candidly examine the whole subject and consider the facts and arguments I have presented, can doubt that the present arrangement is one of true economy to the Commonwealth in every point of view, since even if no good shall arise from the experiments carried on at the Farm,—which is hardly possible,—the expense is no greater now than it would be under other management.

And now, farmers of Massachusetts, I appeal to you to sustain, encourage and coöperate with the Board of Agriculture. Remember there can be no good representative without a good constituency, for it is their confidence and support that give him his strongest moral power, that encourage his hand and cheer his heart. You farmers are the constituents of the Board of Agriculture, for its members are chosen by you to act for and to represent you, and the only reward they have for their time and their service is the consciousness of doing something to promote the mutual welfare of us all.

THE CULTURE OF FRUIT.

From an Address before the American Pomological Society, by MARSHALL P. WILDER, President, and published, by request, in the "Transactions" of the Norfolk Agricultural Society.

Amidst the rapid strides of the arts and sciences in our time, it is gratifying to know that Pomology has not been stationary. Few subjects exhibit so remarkably the progress of civilization and improvement, as the cultivation of fruit. It is now only about a quarter of a century since the establishment of the oldest horticultural society in America. Then, these associations were few and feeble; now they are numerous and influential, extending from the British Provinces to the Gulf of Mexico, and from ocean to ocean,—all working together in harmony with each other, and aiding our association, whose field is our national domain. Then, the fruit crop of the country was not deemed worthy of a place in our national statistics; now it exceeds thirty millions of dollars annually, and is rapidly becoming one of the most valuable and indispensable products of our republic. Then the sales of fruit trees were numbered by hundreds, now by hundreds of thousands. Then choice fruit was a luxury to be found only in the palace of the opulent; now it helps to furnish the table of the humble cottager, and comparatively few are the hamlets which are without their fruit tree or grape vine.

It is only eight years since the organization of this Pomological Society; now, kindred associations exist in various districts and States, and are exerting a powerful and salutary influence. Their delegates and representatives I am most happy to welcome to a participation in the privileges of this occasion.

This improvement is full of promise, and encourages us to greater perseverance. When we look back to the days of Duhamel, Miller, and Forsyth, we perceive that we have made laudable progress. When we compare those numerous splendid varieties which we have obtained, with the limited cata-

logues of the first part of the present century, we may well be proud of our actual knowledge. From the days of Henry IV. of France, when his favorite Bon Chretien was almost the only good pear, from the time of Queen Elizabeth, who sent to Holland to obtain lettuce for her royal table, down to the present century, there has been a gradual advance; but in our day, it has indeed been astonishing, and still our course is onward and upward.

We have long since discarded the inferior fruits of La Quintinye, the skilful gardener of Louis XIV. We have few pears left of the celebrated catalogue of the Royal Garden of Versailles, and by the action of our own association we have rejected more than one hundred varieties as unworthy of perpetuation. At present, who would give a place in his garden to such pears as the Chatbrule, the Martin Sec, the Messire Jean, the Bourdon, the Lansac, the Cassolette, and a host of other worthless sorts? Some good fruits have survived, as the White Doyenne, Madeline, Jargonelle, and others, but a part of these only are suited to general cultivation; yet how limited their number, and how inferior their quality, when compared with our choice modern seedlings, and the royal profusion of fruits which now crown our tables.

When Van Mons, the patient and skilful observer, was successfully experimenting in Europe, our Coxe, Prince, Lowell, Dearborn, Manning and others, had commenced their course, and obtained some good results. Then most of our pears were propagated on suckers taken from the forest; now we see millions of young vigorous trees cultivated, sold and planted in all parts of the Union, and where twenty years since not a single specimen of the Pyrus was to be found. The public no longer ridicule the man who plants a tree with the hope of gathering its fruit with his own hands, or the saving of seeds to improve the quality of his fruits. True, Van Mons was ridiculed all his life, and only appreciated by such pioneers as Davy, Poiteau, Deil, and Drapiez. His nurseries were thrice destroyed, as wild, worthless thorn bushes, under the false pretence of "public utility." This was an irreparable loss, for however much his system be discussed and distrusted, it is still true that the results of his experience have been most beneficial to the world.

A member of the American association and myself have in trust many of the seedlings of that great master of pomology, which have not yet fruited. We have those of the eighth generation, which, from vigor, beauty and signs of refinement, give promise of superior character, and seem to confirm his doctrine of improvement by successive reproduction. And while we are anxiously awaiting the further and ultimate results of his theory, others on this side of the Atlantic are zealously engaged in hybridization and experiments which cannot fail to be of immense advantage to the scientific and practical cultivator.

This progress should cheer us onward. No other country, in extent and variety of soil and climate, is so well adapted, or offers so great advantages to the pomologist. Not only does our correspondence from abroad testify to the truth of this statement, but our rapidly extending domain continually develops new facts in confirmation of this sentiment.

By the reports from individual fruit growers, and from associations, it appears that some varieties of the pear succeed equally as well in the extreme south part of our Union as in the north. A gentleman from Oregon Territory recently informed me that settlers there had already provided themselves with extensive orchards, and from which they gather fruits of great size and excellence. He also makes a similar report in relation to Washington Territory, and instances among others an orchard of one hundred acres, which is now yielding a large annual income to its proprietors.

A letter from the Vice-President of this society for Utah, on the borders of the Great Salt Lake, expresses the hope that it will not be long before that region shall be a successful rival of other parts of the Union in variety and excellence of its fruits. Similar accounts are received from the district of Santa Clara.

Another communication, from an officer of this society in California, assures me of the great progress in our cause in that State, and pledges a full report of its horticultural exhibition for our Transactions. One of my neighbors, who went to California in 1854, and now residing in Napa city, writes: "Such is the rapid growth of vegetation in that district, that apple trees, from seed planted in the spring of 1853, and budded the same year, yielded fruit in the autumn of 1855." He says: "I wish you could take a look at our peach orchard, loaded with

three to four thousand baskets of fruit. You could hardly believe that the trees had made all their growth, and were most of them raised from seed, since I came to California, February 1, 1854. The crop from this orchard is now (July 18, 1856) going to market, and we expect will amount to between ten and twenty thousand dollars." The proprietor of that crop has called on me within a few days, confirms these statements, and reports that the crop and prices fully realized all anticipations.

Such is the zeal now manifested in the cause of pomology, and such are the facilities for intercommunication, that we are continually receiving valuable contributions from all parts of the country and the world.

When we consider the progress of the grape culture in the single State of Ohio, and its great increase in other States, amounting now to more than two millions of dollars annually —the immense quantities of peaches and strawberries brought to our markets, the rapid multiplication of the apple, the pear, and other fruits throughout our land, and the millions of trees annually sent out from the various nurseries, it is not easy to calculate the future importance of fruit culture, whether viewed as a means of furnishing luxuries for our table, or articles of domestic and foreign commerce.

In my last address, I called your attention to the importance of raising new and improved varieties from seed as the best method of increasing and preserving our supply of choice fruits. Whether the theory of the running out of varieties be true or false, so thoroughly am I convinced of the great practical utility of this recommendation, that I feel especially desirous, while I have the opportunity, of encouraging you to perseverance, and of guarding your minds against exposure to failures.

A false doctrine prevails among some, although founded on the theory of Vans Mons, "that scions taken from seedlings, and grafted into stocks, however strong and healthy, will not yield fruit earlier than it may be obtained from the mother plant." Adopting this theory as true, many cultivators have been discouraged on account of the length of the process. Whatever may have been the experience which called forth this theory from its learned author, in the localities where it originated, or where it has been advocated, my reading and personal

observation constrain me to question its truthfulness; certainly its application to our own country. For instance, the fact is familiar to you all, that scions of the pear come into bearing, when grafted on the quince, earlier than on the pear stock. This is believed to result from the early maturity of the quince, which, while it does not change the variety of the pear, imparts its own precocity thereto. We realize a corresponding hastening to maturity when the scion is grafted into a pear tree which has also arrived at maturity; especially is this to be expected when the stock is in itself one of a precocious character. If any facts seem to oppose this doctrine, they may be regarded either as exceptions to the general law, or as the results of locality and cultivation.

The physiological principle of the vegetable kingdom under which this doctrine obtains is, that the bud contains the embryo tree, and that the strong or precocious stock constrains it to elaborate more material into wood and foliage, and thus promotes both growth and fruitfulness.

Common sense, as well as common observation, confirm this statement. Witness the pear, which we have known to fruit the fourth year from seed, when grafted on the quince. We know a seedling from the Seckel pear, grafted on the Bartlett, which bore the present season, and is only four years from the seed. The Catharine Gardette, raised by Dr. Brincklé, was brought into bearing by grafting on the quince, in five years, while the original seedlings, in all these instances, are only three to five feet in height, and will require several additional years to bring them into bearing. Is it reasonable to suppose that a seedling pear, which in two years, in a given location, attains the height of one or two feet with but few branches, will fruit as early as a scion from the same seedling when grafted on a strong tree, which elaborates and assimilates through its abundant branches and luxuriant foliage, ten times the amount of all the elements constituting growth and maturity?

Hence, enforcing a former suggestion in respect to raising new varieties, I respectfully urge you to continue and increase your efforts, and in order to hasten maturity, and to multiply the chances of success, I confidently recommend the grafting of seedling fruits at the earliest possible moment.

In respect to the best method of obtaining choice varieties

from seed, I urged you "to plant the most mature and perfect seed of the most hardy and vigorous sorts."

Additional experience has confirmed my faith in this doctrine; for where seeds have been obtained from cross fertilization of healthy and strong growers, the progeny has partaken of the same character; but where the parents have been of slender habit, or slow growth, the offspring have exhibited corresponding qualities. If this fact may be relied upon, though the process of artificial impregnation be difficult and tedious, yet pursued with skill and perseverance, it will ultimately secure a rich reward. We should not be disheartened by the poor success of Duhamel, or of Mr. Knight with his hybridized pears; for the failure of the latter is attributable to the selection of inferior varieties, from which his seedlings were raised. In reliance upon natural fertilization, I would still encourage the continual planting of the seeds of choice varieties of all kinds of fruit, in the belief that new and valuable varieties may thus be obtained. By these various processes, we shall have continual accessions to our collections of such choice fruits as the Beurre Clairgeau, Beurre d'Anjou and Doyenne Boussock pears. Let nothing discourage you in this most hopeful department of pomology. Go on, persevere:—

> "Give new endeavors to the mystic art,
> Try every scheme, and riper views impart;
> Who knows what meed thy labors may await?
> What glorious fruits thy conquests may create?"

These are triumphs worthy of the highest ambition, conquests which leave no wound on the heart of memory, no stain on the wing of time. He who only adds one really valuable variety to our list of fruits is a public benefactor. I had rather be the man who planted that umbrageous tree, from whose bending branches future generations shall pluck the luscious fruit, when I am sleeping beneath the clods of the valley, than he who has conquered armies. I would prefer the honor of introducing the Baldwin apple, the Seckel pear, Hovey's Seedling strawberry, aye, or the Black Tartarian cherry from the Crimea, to the proudest victory which has been won upon that blood-stained soil.

But the production of new and choice varieties of fruit is not the only labor of the pomologist. The great annual loss from decay constrains me to say a word more on the preservation of fruits. Probably twenty five per cent. of our summer and early autumn fruits either rot, or, to prevent loss, are forced upon the market at very low prices. In the hot season of the year, and with certain species of fruit, this evil cannot be entirely overcome; but that it may in a great measure be controlled by suitable fruit-rooms and other expedients, and that we may thus prolong the season of fruits beyond their usual duration, we entertain no reasonable doubt. What we especially need is valuable late autumn and winter sorts. These, however, will not supersede the necessity of suitable storehouses, without which the heat of our warm autumnal months is liable to start the ripening process, and compel us to dispose of them.

The proper construction and management of these is, therefore, commanding the attention of pomologists, both in this country and in Europe. Their success is found to depend on a perfect control of the temperature, moisture and light. After having built and managed four fruit-rooms, upon different plans, I am of opinion that a proper equilibrium of temperature and moisture cannot ordinarily be obtained without the use of ice. The preservation of the apple is less difficult than that of most other fruits, and is tolerably well understood by our farmers. Still, how few specimens, even of this fruit, are brought to our spring market in a fresh and perfect condition! The art of keeping the pear, and fruits of delicate texture, is much more difficult; and it is to these I particularly refer.

Having heard of the great success of Mr. Schooley, of Cincinnati, Ohio, by his celebrated discovery for the preservation of meats, I opened a correspondence with him with respect to the application of the same process to the preservation of fruits. He subsequently visited me at Boston, and advised as to the construction of a fruit-room upon his principle. This I have found, during the last winter and present summer, to operate in accordance with his statement, as illustrated by Professor Locke, in his "Monograph upon the Preservation of Organic Substances." By his plan, the temperature and moisture of the fruit-room, and consequently the ripening of the fruit, may be perfectly controlled. One gentleman informs me that he kept

strawberries in a fruit-room constructed on this plan, from June first to the twentieth, in perfect condition for the table; and he entertains no doubt of its complete success in the preservation of apples and pears indefinitely. Mr. Schooley writes me that, in the month of June, he received several barrels of Bellflower apples, which had been kept for eight months, that were sold in that market, at two dollars and twenty-five cents per bushel. The remainder, out of eight hundred bushels, was sold at home at three dollars per bushel. These apples were purchased at random from the strolling wagons passing through the streets of Dayton, and were more or less bruised by careless picking and transportation. My own experience corresponds with these statements.

The construction of these rooms is simple. All that is required are walls made of non-conducting materials, with an apartment for the ice above the fruit-room, and with Mr. Schooley's descending flues for the cold air, so as to preserve an equable temperature and moisture, and to hold the ripening process in suspense. The air, by passing over the ice, is deprived of its moisture, and, being cold, and specifically heavier than the surrounding atmosphere, falls through his descending flues, and, by a ventilator, escapes on one side of the room, thus creating a temperature not only cool, but dry. This principle I am informed by a distinguished member of the medical faculty, may be applied to the construction of hospitals with great advantage, so that the air may be kept at a uniform temperature and degree of humidity.

In these remarks, our object has been to provide against the maturing of fruits until the season when they are wanted for use. Care should, however, be exercised, especially with the pear, and more delicate fruits, not to reduce the temperature much below 40° of Fahrenheit, lest the vital principle of the fruit be destroyed, and the flavor lost.

Time admonishes me to be brief, but I cannot refrain from alluding to the appropriate location, soil and treatment, of fruit trees. These are subjects surrounded with mystery, and which can be relieved only by study and personal experience. The importance of thorough draining and perfect preparation of the soil, have not received the consideration they deserve; especially where its silicious character does not furnish a ready natural

conductor to superfluous moisture. Thorough draining lies at the foundation of all successful cultivation. In cold, wet, undrained grounds, the disease of trees commences at the root, which absorbs injurious substances, and the tree ceases properly to elaborate its nutritious matter. Wherever there is an excess of water, and consequently too low a temperature, and the soil is not properly drained and thoroughly worked, the vital energies of the plant are soon impaired, and its functions deranged. I am inclined to think that death by drowning is quite as common in the vegetable as in the animal kingdom, with this difference, that it is not so sudden. How many of the diseases, such as the spotting of the leaf and fruit, the canker, fungi and decomposition of the bark are attributable to this cause, it is not easy to determine. Perfect drainage, which should always be accompanied with subsoiling or trenching, permits the air and light to penetrate and sweeten the soil, warms it, and prepares its latent fertilizing properties for the nourishment of the plant.

A writer in the Journal of the Royal Agricultural Society of England, says: "I have frequently found the soil of a well-drained field higher in temperature from ten to fifteen degrees, than that of another field, not so drained, though in every other respect the soils were similar." Another advantage is, that vegetation seldom or never suffers from the drought, where the soil has been properly drained and worked.

The necessity of thorough drainage and perfect pulverization of the soil, is not less for fruits in open cultivation, than for the grape under glass, where one of the prerequisites has ever been the perfect drainage of the border.

In relation to locality, some succeed best in one place, while others flourish well in several districts, and are elsewhere nearly worthless, and a few are adapted to general cultivation.

The affinity of the stock to the graft, is of immense importance to the happy union and success of both. Some unite as though ordained by Heaven to be joined, while others resist all the appliances of art. We have seen trees made sick by the insertion of an uncongenial scion, and finally destroyed. Well does a writer remark, that "it is from the analogy of the stock and graft that healthy vigor results, and unless this analogy is sufficiently close, it is impossible to obtain fruits in perfection. Not only does this influence manifest itself in the vigor and

hardiness of the tree, but also in the quality of the fruit and the time of ripening." We must, therefore, learn on what kind of stock, in what soil and aspect, and with what treatment each variety will flourish best. As I have before remarked, every tree, plant and herb, from the cedar of Lebanon to the flag of the Nile, from the loftiest oak of the forest to the humblest daisy of the meadow, from the fantastic parasite luxuriating in solstitial air to the little flower that peeps from Alpine snows, every thing endowed with vegetable life, requires its own peculiar element and treatment to sustain its vigor, and secure its highest possible perfection. However varied this sustenance may be, and whether derived from earth, air or water, if it be uncongenial, deterioration and decay are inevitable. Every branch, twig and bud, every leaf that flutters in the breeze, is an organized and living body. Each has its correlative part, and any injury done to the one will be felt in the other.

Under these general laws, each variety requires a particular treatment, and should be nurtured with a wise reference to its peculiarities and habits. I am inclined to believe that the most valuable treatise on pomology would be one descriptive of the wants of each sort. The pomologist must, therefore, study the constitution and natural tendencies of each variety, as a father would those of his children:—

> "Each tree a child, your aid their weakness rears,
> Directs their youth, and tends their drooping years,
> Their different bents you mark with studious eye,
> Their laws you give, their manners you supply;
> Directing thus their flowrets, fruits and leaves,
> Your potent hand Creation's work achieves."

My experience has so often been solicited by private communication in relation to the pear upon the quince stock, that I deem it proper to introduce it in this connection, with the reasons on which it is founded. Many varieties of the pear thus grafted grow vigorously, and bear abundantly. I am aware that an impression has prevailed in the minds of some, unfavorable to the cultivation of the pear on the quince stock, an impression which must have arisen from an injudicious selection of varieties, or improper cultivation. In this opinion, I am happy to know that I am sustained by Mr. Barry, in his

address before the North Western Association of Fruit Growers in Iowa, and by other distinguished pomologists. Pears upon the quince should be planted in a luxuriant deep soil, and be abundantly supplied with nutriment and good cultivation. They should always be planted deep enough to cover the place where they were grafted, so that the point of junction may be three or four inches below the surface. The pear will then frequently form roots independently of the quince, and thus we combine in the tree, both early fruiting from the quince, and the strength and longevity of the pear stock. For instance, of trees of the same variety, standing side by side in my own grounds for ten years, and enjoying the same treatment, those on the quince stock have attained a larger size, and have borne for seven years abundant crops, while those upon the pear stock have scarcely yielded a fruit. We have, also, others on the quince, which twenty-five years since were obtained at the nursery of Mr. Parmenter, where now is the most populous part of the city of Brooklyn, N. Y., and which have borne good crops for more than twenty years, and are still productive and healthy.

That the introduction and cultivation of the pear upon the quince has been a great blessing, I entertain no doubt, especially in gardens, and in the suburbs of large towns and cities. And as to its adaptation to the orchard, I see no reason why it should not succeed well, if the soil, selection and cultivation be appropriate. A gentleman in the eastern part of Massachusetts planted in the years 1848 and '49 as many dwarf pear trees as he could set on an acre of land at the distance of eight by twelve feet, and between these rows he planted quince bushes. In the fifth year from planting he gathered one hundred and twenty bushels of pears and sixty bushels of quinces. Of the former he sold seventy bushels at five to six dollars per bushel, and he now informs me that he has lost only three per cent. of the original trees, and that the remainder are in a healthful condition.

THE PRACTICAL FARMER.

From an Address before the Nantucket Agricultural Society, Oct. 28, 1856.

BY C. L. FLINT.

I congratulate you, Mr. President and gentlemen of Nantucket, on the complete success of this the first exhibition of your agricultural society. If "well begun" is "half well done," you may anticipate a success as glorious as this beginning is auspicious.

An occupation opening such vast fields of experiment, so wide a range of practical and scientific inquiry, and presenting so many objects of interest as that in which we are engaged, seems to invite, and should secure, for the promotion of its interests, the highest efforts of human genius. For who can imagine a grander employment than that of aiding the progress of an art which seeks to devise the means of obtaining vegetable and animal products for the support of man in the most perfect and economical manner?

Modern times, indeed, have witnessed the union, to some extent, of scientific research and actual experiment in the field; and chemistry, botany, vegetable physiology, and especially mechanics, have contributed largely to the development of improvements in farming; but science still deals too much in mere abstractions, and the practical man has not yet thrown off all his jealousies of scientific theories; and it is rare that we find even a moderate degree of practical skill and scientific knowledge combined in the same individual.

Some men pass from the theory of farming to its practice, as a hungry cow dashes into a clover field. You look with astonishment at the enthusiasm with which they take hold of farming, deluding themselves with the idea that to be a practical farmer, is the easiest thing in the world.

But what is it to be a practical farmer? Is it merely to be able to dig from morning till night, and then to sleep from night

till morning? Is it merely to be able to hoe, to hold plough or to mow? The most ignorant day laborer on your farms, can, as a general thing, go through these operations; for as commonly understood, they require only a good degree of physical force.

What then constitutes a good practical farmer, in the fullest and highest sense? There must be not only physical strength and manual skill in the use of implements, but also the intellectual qualities of sound judgment, providence, discretion and solid good sense. Suppose a shoemaker should fail, through neglect or ignorance, to keep his tools in order, and should work with dull knives, with which he could do no good work without the expenditure of time and labor which would otherwise be unnecessary, would you call him a good practical shoemaker.

If a mechanic should begin work on a job he had undertaken, and neglect to keep an account by which he might see from time to time whether he was gaining or losing by his labor, and as a consequence should lose money and fail, would you call him a good practical mechanic?

And how can we put a high estimate on the experience and practice of a man in any business, if at the end of a certain number of years of close application, he has done no more than merely to live without accumulating a provision for his old age? A newly arrived foreign day laborer can generally do that, without an experience of twenty years.

No; a man may practice medicine and not be a good practical physician, or he may practice law without being a good practical lawyer. I have known many such myself, and I have no doubt such instances of lawyers or doctors having some practice, without being what could be called good practical men, are within the knowledge of many who hear me.

And now, looking at the matter in the light of plain, practical common sense, is it not absurd to suppose a man can be a good practical farmer, who can do no more, and who knows no more, than to work like a slave day after day, without bringing the light of intelligence to bear on the toils of the hand? Without trying to shorten labor, to increase his crops, and at the same time to diminish his expenses?

You will see many farmers neglect entirely the preparation

and care of manures. They throw every thing out of the barn window and let it lie, as was customary twenty years ago, to be drenched by the rains which wash out all the soluble and most valuable parts, and carry them away, or to be parched by the sun which sets free many of the rich gases, and sends them flying away into the air to be caught again by the rains and carried down upon the fields of other men, while they are lost forever to the owner of the mass of bulky material from which they started. Why should you call such men *practical* farmers, any more than you would call a mechanic who failed to keep his tools and stock in order, and consequently did poor work, a good practical mechanic?

Not long since, I rode through a strictly farming district, and in the space of about eight miles I counted nearly twenty barns all smirched up around the windows as if somebody had been trying to draw an outline map in water colors, directly under the troughless eaves. Twenty years ago, this was a very common sight, as I well remember; but since then, science has taught what chemical changes take place in the manure heap, and the loss from exposure; and though at first only here and there an individual took the hint and economized labor and money by building a barn cellar, yet the leaven began to work, and in time the whole lump will probably be leavened, though it may never admit its indebtedness to the source of the original leaven.

I do not hesitate to say that if mechanics took the course that many farmers do, they would starve to death in less than five years, unless a remarkably favorable conjunction of circumstances protected them from the consequences of their indiscretion. When a mechanic enters upon a certain kind of business he knows just how much he makes, how much a day—if he works by the day—or how much a year, and he can and must regulate his expenses accordingly; thus, if prudent and judicious, he goes on making a little, at all events, and if he lives within his means, a great deal. Thus, at the end of five years, after much self-denial, he will be likely to find himself doing well. But if, after he has begun a particular kind of work, he becomes convinced that it is unprofitable, he leaves it at once with a trifling loss. Now how many farmers can be found who keep a strict account with any crop or any field, or

with their live stock; and if they neglect to do so, how can they tell whether in reality they are making or losing by that particular kind of crop or that particular kind and management of stock? How can they tell in season to avoid a very serious loss, oftentimes?

No; the fact is, there is no business under the sun that requires such varied and accurate knowledge, such close and careful observation of the laws of nature, and such constant study of the improvements in the mechanic arts, as farming; and there is no business that calls so constantly for the exercise of plain, practical, common sense. Without this, no man can be a good practical farmer, no matter how much science or how much knowledge of other things he may have. Probably the fact that only a very small number of those who happen to possess a respectable knowledge of the sciences applicable to farming, were trained in early life upon the farm, so as to get some knowledge of its daily operations, has done much to create an unjust prejudice against science, for it is evident that a man with some systematic knowledge of farming, *other things being equal*, ought to become a good practical farmer before one who has not such knowledge.

I do not mean that to become a good, or even a first rate farmer, a man must be a learned chemist, botanist or physiologist, or a skilful mechanic. Each of these branches must be made an object of special attention, if one would excel in it, and requires the constant study and application of a lifetime, while the farmer, like other men, must earn his daily bread, and meet the duties which society and his occupation impose on him.

Nor do I wish to convey the idea that by study and knowledge of the sciences, farming itself can ever become an exact science like mathematics, or mechanics. They who maintain that it may be reduced to the same certainty and system as any mechanical pursuit, greatly deceive themselves. The manufacturer has only dead and inert matter to work upon. He can control the spindle and the loom by a machinery so nice as to seem almost instinct with life; but who can control the infinite variety of influences which modify the growth of an acre of corn? Who can command the gentle rains, the silent dew, and the genial sunshine? Who but Him who holds the storm in his hand and can still the raging sea?

But to maintain that nothing can be done to promote the development of our agriculture,—to cling to the favorite prejudices of a past age,—to reject the proffered aid and refuse the helping hand of science, and thus trig the wheels of progress, is as unreasonable as to go to the opposite extreme and maintain that science will effect an entire revolution in farming and make labor a pastime. Truth generally lies between extremes, and the true medium must be arrived at by the aid of sound judgment and common sense; but if a man is prejudiced, either by the results of early training or a long life of routine, his judgment is not sound.

One thing is certain, that under the influence of *practical farming*, so called, the land of New England has notoriously deteriorated to such an extent that it is estimated that at least a thousand millions of dollars would be required to repair the effects of a wasteful and exhausting system of cultivation.

Now what are we to do about it? That is the question which must be met. Much has already been done, but far more still remains to do. If we are to sit idle, content with our present acquisitions in farming, and scout the idea of all attempt at further progress, I admit the perfect folly of spending time and money in experiment; but if we are to keep up with the march of improvement in other professions, or in the agriculture of other states and countries, how are we to work unless it be by practical experiment, or by reliance on the crude theories and ill-digested, uncertain deductions of those who claim to speak by authority of science?

Among the greatest difficulties which we as farmers have to contend with, will be found the custom of making careless statements and hasty conclusions, and the habit of conducting experiments in such a vague and unsatisfactory manner, that they are entirely useless as data upon which to found correct rules of farming. How few, even of those who are willing to make experiments, can bring to them the exact and nice observation of all modifying circumstances of the weather and temperature through a long season, or can keep constant and careful records of every fact which will be of importance to one living in another part of the State, or on a different soil? Suppose you raise a field of corn, for example, and undertake to make a statement for the good of the community? The history and

quality of the seed should be stated, the previous treatment and nature of the land on which it grows, its composition, its mechanical condition, its exposure to the sun, its depth, the manner and depth of ploughing, the true character and the quantity of the manures used, the manner and time of applying them, the time of planting the seed, and the minute details of the cultivation through the year, the expense of labor, the changes of the weather and its effects on the result, the harvesting and disposition and profits of the crop should all be set forth with a rigid exactness, for without all these particulars, and even more, the experiment is comparatively worthless. But to observe all these items, and to make a clear and faithful statement of them, requires much time, and few farmers can afford time at the busiest season of the year. Hence, while we have many experiments and accounts of experiments, in a scientific point of view, they are of no value, though made in good faith, and perhaps with even more care and expense than the farmer can afford to bestow upon them. Now here we want the coöperation of the intelligent farmer and the man of science, the farmer to observe and make sure of his facts, the man of science to take up these facts to analyze them, and to make deductions and suggestions for the farmer. We want a series of patient and accurate experiments, recorded in such a manner as not to mislead. We want them not in one branch of farming alone, but in nearly all; in the permanent improvement of lands, in the breeding and feeding of stock, in new and improved implements, and in a thousand other details in which our knowledge is still very imperfect. And let it not be forgotten that an exact, faithful and systematic statement of every experiment so conducted, is of the utmost value to the community; and with such statements of such experiments, new discoveries and new progress would inevitably follow. Then let all such statements be brought together, thoroughly digested and analyzed, and we shall have a collection of real facts in agriculture, not theories to be afraid of, but facts upon which it will be safe to base our rules for daily practice.

Here is the true field for the agricultural societies to exert a direct and powerful influence on the progress of scientific and practical agriculture throughout the State, and for the more complete and rapid development of the material resources of

the Commonwealth. Let the officers of every society be stimulated to renewed effort to raise the character of the experiments conducted under their influence, to a higher standard, and encourage more complete and reliable records of such experiments, and they will do infinite service in promoting agricultural improvement among us, and answering the innumerable questions and difficulties which meet us at every turn of our daily practice in farming, and by enabling us to supply our wants and to increase and develop the capacities of our farms in the most perfect and economical manner.

You, gentlemen of the Nantucket Agricultural Society, have a work to perform in developing the resources of your beautiful island. It is within your power, by proper effort, to bring many of your soils, now comparatively barren, to a high state of fertility. I have been, at different times within the past three years, over nearly the whole island, have visited many of your best farms, your plantations of forest trees and cranberries, and have been not only gratified and surprised at what has already been attempted and accomplished, but convinced that much more may be judiciously undertaken with far greater and more surprising results.

He who shall succeed in cultivating forest trees will be a public benefactor in more senses than one. Forest trees in exposed situations like hundreds of acres along your shores, not only afford shelter to other plants, making their cultivation practicable which would have been undertaken in vain without such a protection, but actually increase the fertility of lands in their vicinity. The complete success which has attended the culture of pines in situations somewhat like yours in England, in Scotland, and particularly in France, to say nothing of the successful experiments in this country, justify the prediction that such plantations will not only enhance the value of property around them, but pay a good profit on the outlay.

Time would fail me to enter into the details of the best modes of planting forest trees, even if it were in my power to make any suggestions of value to those among you who already have some experience, but I may briefly state that in all plantations of forests a mixture of species is to be preferred to any one variety. You have now chiefly the maritime pine, (*pinus maritima*,) which seems to be growing luxuriantly. Now if you

plant the white birch, or the Scotch larch, or the goat willow, (*salix caprea*,) you would find that the two or three species of trees would rather benefit than injure each other. The Scotch larch is particularly valuable in forming a soil out of barren drifting sands, for being a deciduous tree, its annual foliage makes a thick layer of vegetable material which covers the sands, while it does not essentially interfere with the growth of smaller plants. This process being repeated year after year, comes in time to produce a good and fertile soil out of barrenness and sterility. The white birch, so admirably adapted to a mixture in situations like yours, grows rapidly and in ten or fifteen years may be thinned out to give additional space to the pines, which by that time will begin to need it. It is very easy of propagation by seed, and probably ten thousand young trees, from a foot to three feet high, could be had at a cent apiece. I have this season visited a plantation of pines on a soil precisely like much of yours, a perfectly barren sand, the owner of which informed me that it had yielded him annually, on an average, a cord of wood to the acre for twenty years during which it had been formed. The soil had evidently been improved; young oaks and other hard wood trees were appearing thickly among the pines, and no one could have told that the plantation had been artificially formed, so thick and forest-like had it become.

"Aye be sticking in a tree, Jock; it'll be growing while you are sleeping!"

You have, also, unusual facilities for the cultivation of the cranberry. We dwellers on the continent must take our turn at the frosts of spring and the frosts of autumn, either of which will be liable to injure or destroy our entire crop. You have nothing to fear from this source, while you have many acres which may be very profitably devoted to this crop. I know one man in this State who for fifteen acres of cranberries has this year received over thirty-five hundred dollars, and for the same last year (1855) received over four thousand dollars, and this with no cost of cultivation except the picking.

On this subject I should be glad to dwell at greater length did time and your patience permit, for of all our fruits I consider the cranberry one of the most beautiful, the most healthful and the most profitable.

There is one other plant for which your climate and many of your soils are admirably adapted. I refer to the osier willow. The article now very extensively used for basket making is imported mostly from abroad and large prices are paid for it, while there is no reason why we might not raise it to perfection and with a fair profit. With this plant as a cultivated crop I have no practical experience, but I have made it a special study; have sought out old men from abroad who have cultivated and worked it all their lives, and have learned many a curious fact with regard to it which, if this were the proper place, I should be glad to allude to. I hope your society will encourage experiments with this plant, and give the results to the world.

There is also another plant which I would suggest to you the importance of cultivating so far as to satisfy yourselves with regard to it; and that is the Chinese sugar cane, a plant which belongs to the family of grasses, lately introduced among us, and which I am inclined to think will prove to be an exceedingly valuable addition to our cultivated crops. It is much like Indian corn in appearance, when young, and like broomcorn when arrived at maturity. It is unquestionably very rich in saccharine matter. I have seen fine molasses made from it, and experiments made and in process have demonstrated the practicability of crystalizing it into sugar. It is worthy of careful experiment, particularly as a forage plant to sow in drills and cut up green for stock, as we do green corn. Its cultivation is like that of Indian corn, and it will grow and flourish wherever that will.

I have mentioned these special crops as, among others, worthy of the encouragement of your society. You may exert a direct practical and powerful influence in introducing or extending their cultivation, and upon the agriculture of the whole island. I need not remind you that the object of an agricultural society is not merely to make a show, or to delight the eye or please the fancy. We *must* be progressive, and all true progress requires constant labor and activity. Let every farmer on this island feel that he has a duty to perform, a duty which he owes to himself, to this society, and to the State, and he will derive the practical advantages now offered in the form of associated effort.

FARMS.

ESSEX.

Report of the Committee.

From the course of action adopted by the society for the present year, in raising their premiums for farm management from thirty to fifty dollars, it is obvious that the object is, in their judgment, one of great importance, if not paramount to all others. The object of the trustees was two-fold; first, to bring the attention of farmers back, if possible, to the same view of the subject which was taken by the society and the public in the days of our early history; and secondly, to draw out such statements of the various modes of management, as when published by the society should stimulate others to engage in similar improvements.

But the society seems doomed to disappointment. Why it should be so, is more mysterious than ever. To say nothing of fancy farming, in which old Essex is certainly not wanting, it is believed that the general style of substantial, productive farming here, is not exceeded, if equalled, in any other part of the State. And yet, notwithstanding the large premiums held out for the present year, two claimants only have appeared, and for some reason one of them has withdrawn. Two visits were made by the committee—the first in June, the second in September.

George F. Devereux, of Danvers, is the only claimant. His statement will be read with interest. From the run-down condition in which he found his farm two years ago, he has contrived to bring it into such a state that he is straitened for room where "he may bestow his fruits and his goods." He has already expended one thousand dollars upon the buildings in repairs, and had, at the time of the committee's visit in September, the frame of a barn upon the ground for raising, sixty by forty feet. Other improvements are projected and in pro-

gress, and the evident ambition of the owner to bring his farm up to the first rank, is, certainly, most commendable.

The committee, however, in fidelity to the trust reposed in them by the society, are compelled to say, that the farm of Mr. Devereux is wanting in some of the elements which go to make up a first class farm at the present time. The rule requires the committee to take into view "the entire management and cultivation, including lands, buildings, fences, orchards, crops, stock, and all other appendages." This rule has hitherto been strictly enforced, and for the committee to depart from it just as the society has nearly doubled its premiums, would be taking a responsibility upon themselves which they are unwilling to assume.

Having said thus much officially, adverse, indeed, to all that our private and personal feelings would dictate, we proceed to allude to a few of the improvements where we can bestow unqualified praise.

The onion, corn, carrot, strawberry and potato crops, occupy most of that portion of the farm which was cultivated by the former owner. But Mr. Devereux's enterprise and energy have carried him beyond this limit. The part of the farm lying beyond the cultivated portion referred to, is just now in its chrysalis state. The alders and bushes are yielding, and are made to do penance, and to work restitution for their long riot in the Goshen of the farm. They are piled upon or near the spot where they grew, as is appropriate, oyster shells being intermixed throughout, layer for layer, the whole then covered with earth and burned. The kiln requires about two weeks of burning. The lime and ashes are applied to the soil in various ways, both alone and in compost, both on corn and grass. Mr. Devereux informed the committee that it required about fifty bushels of shells to make five of lime, and the shells are drawn by horse teams from South Danvers and Salem. And yet he is satisfied that it pays. He showed us a field of moss-covered land, one acre of which had had a dressing of three cords of oyster shell lime, and one of stable manure; and that dressing had changed the hay crop of one-half a ton in 1855, to one of a ton and a half in 1856. The present year has been remarkable for grass, it is true, but the great change must have been produced by the oyster shell lime and his skilful application of it.

It will be seen by Mr. Devereux's statement, that he intends hereafter to give more attention to his orchard. Other important improvements are also in contemplation, and will undoubtedly be effected.

As Mr. Devereux's statement is so full and explicit, it is unnecessary for the committee to add any thing more than to recommend a gratuity of twenty-five dollars.

DAVID CHOATE, *Chairman.*

Statement of George F. Devereux.

I have owned and occupied my farm since 1854; having cultivated it consequently three seasons. When I purchased it, it was in very indifferent order. It consists of thirty-two acres of land, about equally divided into two fields. The front field was mostly under the plough when I took the farm. It had been cultivated chiefly upon shares for several years, and severely cropped during the whole time—regard being naturally paid, under such circumsiances, to deriving from it the utmost immediate profit, without reference to improvement. The back field contained about ten acres of grass land, with about five or six acres of wood and bushes. The mowing was entirely run out, cutting not more than an average of half a ton per acre; having been very little cultivated, in any manner, for many years. The walls were foul with bushes and weeds. There was no drainage, although some portion of the land was low and swampy, and covered with flags and weeds natural to such tracts. There were a few old apple trees upon the place, in very bad order from long neglect; and a few young ones, that had been set out, but suffered to go to waste from the same want of care. The buildings, fences, &c., were in miserable order.

I have not attempted to create a show-place by mere expenditure money, for I did not feel myself in a position for such an undertaking. My aim has been to bring about a constant and gradual improvement by careful and prudent management, as fast as I was able. I have endeavored to do well what I have attempted at all. I have repaired all the buildings and put them in good order. Last year I built a corn house sixteen by

twenty-five feet, with a cellar and open shed beneath it. My crops are so much increased that I am now putting up a new barn, forty by sixty feet, and eighteen feet posts, with a cellar underneath. I found about eleven acres, out of the sixteen in the front field, under the plough. I have kept the same in cultivation through the three summers, manuring it thoroughly, in order to get it into suitable condition to lay down to grass. I have sowed two acres of it this fall, with rye and grass seed, after a crop of oats, cut green and cured for fodder. I have now upon the rest of the field, three acres in Indian corn, two in carrots, about six in onions, about half an acre in marrow squashes, and perhaps an eighth of an acre in a strawberry bed, set out this spring. During the last two years, I have planted about two hundred young apple trees of the best varieties, and trimmed out, cleaned and grafted all the old ones. Out of all the trees I have set out, I have lost but two or three. They are all growing fast and well. I think this field now produces fully one-half more than when I commenced with it.

I have used stable manure, night-soil composted with meadow muck, shell lime, and small quantities of guano and DeBurg's phosphate. The land had never been ploughed deeper than four or five inches. I have gradually increased the depth to ten or twelve inches. I have deepened the cultivation as fast as I thought to be prudent, making considerable use latterly of the Michigan double plough. Last year I used about one hundred and twenty cords of manure, and about twenty cords more this past spring.

In the back field, I broke up last year two acres and a half, which I manured with a night-soil compost, and laid down to grass. Last fall I also broke up another acre, which I manured with shell lime, one cord stable manure to three cords shell lime, and laid down also to grass. This spring I broke up two acres more of the old grass land, manured with stable manure, three cords per acre, and planted with potatoes. I also cleared three-quarters of an acre of the wood land, of the birch bushes and other growth, manured it with three cords stable manure, and planted with potatoes. I also cleared another acre of bushes and under-brush, leaving a handsome growth of young trees standing.

I have opened drains through the piece of low land before

mentioned, which stretches across the middle of this field. By way of experiment, I spread four horse-cart loads of shell lime upon about one-quarter of an acre of this swale, which bore nothing but flags and trash, not worth cutting. The result was, that it brought in a crop of Herds-grass and clover; and I cut upon it excellent hay at the rate of about one and a half tons per acre. This spring, I set out in the back part of this field from sixty to seventy young apple trees,—intending to break up the ground they occupy, this fall, for cultivation. The first year I cut about five tons of hay; this year, ten tons of hay, besides three tons of oat fodder. All my onion ground had eight cords of manure to the acre. The corn and potatoes were manured in the hill.

I do my work with a team of two horses; and keep two cows and two yearling heifers, and pigs. I employ, on an average, two men, beside myself,—hiring boys from the village, at times, to weed onions and carrots.

My purpose is to lay down to grass, piece by piece, the land which has been under cultivation; and break up in the same proportion of the worn-out grass land, till I get it all in good order.

I cannot get along as fast as I should wish, on account of the expense and difficulty of obtaining manure. The shell lime which I have used, I burned upon the farm. I have had so much to do to put the premises in tolerable order, from the general bad condition in which I found them, that I have had little opportunity, as yet, to attend to any special matters.

Danvers Centre, Sept. 29th, 1856.

Supplement to the Committee's Report on Farms.

It has for a considerable time appeared obvious to many who have carefully watched the progess of the agricultural society, that our annual Transactions were in danger of taking so close a resemblance to those of former years, as to seem to the reader to be a mere re-print of them. Our indefatigable secretary has long observed this tendency, and has spoken of it with earnest apprehension. Others have remarked the same thing. Stereotyping the doings and the reports of previous years, or seeming

to do so, has been the subject of observation in the operations of societies of a different character, in reference to themselves. In an address delivered recently before the Society for promoting Collegiate and Theological Education at the West, the speaker said: "Societies tend to become dry and mechanical, falling into a routine, and losing new growths. Those institutions that are nearest to human life, that feel its transforming power most, will quietly change as it changes; just as the skull accommodates itself to the expanding brain; and they live on without revolution, while those that are fortified against change, and are meant by their donors to be forever the same, will in the end, not only be changed of necessity, but undergo changes by the worst revolutionary processes. To avoid this, we must become *ligneous*, growing upon old growths, and not *herbaceous*, planted every spring and dying every winter." Our agricultural society, if it should not seem like taking too much credit to itself, had conceived the idea inculcated by the foregoing extract, and had acted upon it, before it was so inculcated. When the society perceived that the method formerly pursued of offering premiums for superior farm management, failed of obtaining a full response, it partially changed its mode of operation. The public mind having changed, the society began to adapt itself to that change; when the farmers became disinclined to report their farms, the society began to send out an agent to see them.

It is not true that agricultural enterprise in Essex County is dead, or even sleeping. On the contrary, it is known to be working with unwonted activity. The only trouble is, it is so busy that it cannot stop to report itself. Experiments are making such as have never been made before. But these, as might be expected where there is no harmony of action, are more or less scattering and discordant. What is needed now, is the converging and the perpetuating power of the society. To become available to all, they must be collected, scrutinized, analyzed and passed through the crucible. Not an experiment that is made among the farmers of the county, successful or unsuccessful, should be permitted to be kept in a corner. In this sense, whatever is "whispered in the ear in closets, should be told upon the house-tops." The circumstances in which we are providentially placed by a recent event, call on us to put forth an effort in the direction above intimated. In order to

make the rich gift of the late Dr. Treadwell answer the reasonable expectations of the departed donor,—a gift for experimental purposes only, is it not immensely important to gather up the experimental knowledge of the county, that it may be made to bear first upon the farm itself, and thence to be radiated in every direction?

One word on the subject of changing our established modes of operation. Radical changes are to be watched with a scrutinizing and an anxious eye. Once open the door of innovation, and that door will be hard to shut. But a distinction is to be made between such as are radical and those only that seem so. It is certainly possible to hate the turf, and yet to love the soil—to hate the horse-race, and yet to love the horse! Such changes as are here hinted at will not be likely to find favor in our society, unless young America should become more rampant than the present substratum of fogydom will admit.

Of the necessity of such a change as I am advocating, however, several of the officers of the society have become so impressed, that they have voluntarily contributed the funds necessary for a partial exploration of the county during the year now drawing to a close. The inquiries have related chiefly to manures and their application, as being a subject underlying all others, and in importance, overshadowing all others. These inquiries have been extended into twelve different towns in the county, and in some cases to as many as five different farms in the same town. And it has been most gratifying to notice the kindness and promptness with which every inquiry has been answered, both orally and by letter. To "collect and diffuse information," is an object at least as important for an agricultural society, as for a State Board of Education, whose business it is made by law, and thus far has proved as pleasant as it is important, and will be continued or discontinued of course, as society shall smile or frown upon it.

In making a small circuit through a portion of the county during last year, for the same general purpose, it was apparent, that from motives of delicacy gentlemen were frequently reluctant to communicate fully, when informed that facts so collected were intended for publication. This year it is understood that names will not be published. A list, however, will be left with

the secretary for reference, that any one may be able to verify any statement herein made.

The unprecedented prices which the public are willing to pay for choice pears, calls for the attention of fruit growers, and is receiving it. A gentleman, whom I call Mr. A., this being the first place visited, viz.: July 2, broke up a piece of land in the spring of 1852, which had been a pasture for twenty-two years. Upon a part of it, containing from one to one and a half acres, he planted out in the spring of 1854, from 400 to 450 pear trees, from his own nursery. From seven to eight cords per acre of muscle bed mud had been applied the first year after ploughing, and potatoes were planted.

Trenches were first dug for the trees with a crowbar spade. Oyster shells were thrown into the trenches, and with the exception of muscle mud applied to the potato crop, no other manure was used, except ashes. The trenches were dug fifteen inches wide. Hair-lime from the tanneries, or ashes, have since been dug in round the trees, in spring, and a half bushel of tan is applied to each tree in the fall to defend them from the mice, being first mulched, however, for the two first seasons. Mr. A. thinks he should have lost one-half of his trees had this been omitted. The previous owner, (father of Mr. A.) purchased his seedlings, some thousands in all, and had them grafted during the winter season; they were preserved by keeping them in the cellar, and covering the roots with moist earth or sand. When quite small the whip grafting was, and still is, preferred, but afterwards, cleft grafting. The largest of these sell from the nursery at three dollars and fifty cents each.

The slug is the great enemy of the pear tree, as the canker worm is of the apple tree, and they give it an appearance nearly as bad.

It was interesting to see the successful experiment made to save a tree, where the bark near the ground had died, or had been taken off by the mice, viz.: seedlings set out around the tree, and inserted into it, to supply the sap. This must always be considered a great triumph of horticultural skill, and which is generally done as proof of skill merely; but which in the case of pears, at twenty-five to fifty cents apiece, must pay.

Mr. A.'s method of treating his trees is full of instruction to all of less experience. Many would say the trees are too much

crowded; indeed the standard stocks are but fifteen feet apart; and the dwarf trees are between the rows, though so set out as to stand opposite the spaces and not the trees themselves. But the great peculiarity of the system adopted is, the cutting in, or as some would say, the annual topping down of every tree. One half of the previous year's growth is taken off in the spring. By this method, the trees are kept down; winds affect them less, and they are within reach when pruning and picking the fruit. The Urbaniste is but about ten feet high, and one of this kind has twenty limbs within five feet of the ground. In 1855 no manure was used at all; this year, one-half bushel of tanner's hair with ashes was applied to each tree.

The apple orchard exhibited the same marks of attention and thriftiness as the pear. From 300 to 400 trees, either already in, or approaching the bearing state, strike the visitor in the most agreeable manner. They stand from twenty to twenty-five feet apart.

Here then is a farm of but eighteen acres, one-third of which is unavailable, for ledges, yet yielding a most remunerative crop on the remainder. Mr. A. employs but two men and only about one-fifth part of their time is spent among the trees; or perhaps it might amount to one-half of one man's time. The hay field, the garden, the strawberries, raspberries, &c., require the remaining time.

There is one object of interest upon this farm deserving the attention of the learned, indeed, some eminent geologists have already been to visit it. It is a glacial groove, or rather two of them, in a solid ledge, one of them having once been a hundred feet long, but now broken up in part. The conjecture is, that it is the effect of long wearing of the ice, in some remote age of the world. Such appearances are found among the Alps, but rarely in our country.

In concluding the account of this farm, it may be remarked that fruit raising is highly profitable when well managed. Mr. A. relieves himself for a portion of every day's heavy professional duties, to labor among the trees. No physician ever watched the varying symptoms of the patient more assiduously than he does the appearances exhibited in this orchard. And why should it not be so? As we said before, it must pay. When the price of a half rotten winter Nellis is twelve and a half cents in the

market, and a sound one, half a dollar—when a gentleman at a select party will pass round a plate of pears, and whisper to a friend, that, though he is almost ashamed of it, yet he really gave *five dollars apiece for them*, (a well authenticated fact of last winter's occurrence,) then it is worth while to cultivate fruit for the profit of it. The French nation will be able to furnish new names for a considerable time to come, and it will be necessary; for such names as Duchess de Angouleme, the Grey Doyenne, and Beure Gris D'Hiver Nouveau, have already become prosaic. This is about one-half, and the self-sealing cans, or other modes of keeping fruit for a year or two, account for the balance, and a good natured public foot the bills. All success to the growers of choice fruit, and mercy on the purse of the consumers when they need it!

The second farm visited was Mr. B.'s, of course. His experience in the use of manures will be detailed in another part of this report. Of his style of farming generally, it is impossible to speak in terms too high. My stay at his place, though on a rainy day, would furnish materials for an entire report. I cannot find time, however, even to allude to all I saw. As this has not generally proved a good year for squashes, it may be well to say that Mr. B.'s crop is worth more than last year's, when he had twelve tons to the acre. He generally ploughs in a dressing of green barn manure, and harrows if on the sod. The hills are eight feet apart each way. Five seeds are planted in each hill, and three are left to grow. The ground is stirred five or six times with a horse hoe or cultivator, and hand-hoed three times. Two or three shovelfuls of night soil and meadow mud, well mixed, are put in each hill. The holes are made a foot and a half in diameter, and of the same depth. "The worm at the root," says Mr. B., "affects none but a crop too sparingly manured." One other fact in favor of high manuring was learned at Mr. B.'s, viz.: when he took the farm twenty-three years ago, it was overrun with white weed; but good culture and heavy manuring exterminated the whole, the grass became so vigorous as to bind it out and keep it out. Mr. B. has always raised fine crops of winter rye; twenty-five to thirty-five bushels per acre is a common crop, and the straw is worth about as much as English hay. It grows to the height of six or seven feet, and is mowed close instead of being reaped or cradled.

Mr. B. has a mile of under-ground drain. He estimates his crops to be worth $5,000, and says it has costs about $3,000 to carry it on. But interesting as it might be to dwell on a case of successful farming, regard to brevity forbids it further.

After visiting several farms, and preparing to report them after the plan adopted last year, it occurred to the undersigned that more good would result from giving attention to a single point, and reporting fully upon that. In selecting a subject, that of manures presented itself as being paramount in importance to all others. And knowing that guano and super-phosphate of lime were attracting attention, it seemed desirable to ascertain, as far as possible, the extent to which they had been tried; the kind of land to which they had been applied, the particular crops upon which experiments had been made, and the results.

Continuing the alphabetical designation of gentlemen whose farms have come under notice, that of Mr. C. is next in order. He took fifty loads of meadow mud from the bog last fall, and allowed it to remain for the action of the frost, till spring, upon the spot where it was thrown out, or perhaps drawn up, not however composting it with any thing. In the spring he purchased seven bags of DeBurg's super-phosphate of lime, and applied four and a half of them to his field of corn, in connection with the meadow mud. The mud was in a fine mellow state at planting time, and a good shovelful was put in each hill. A large spoonful of the lime was then put in each hill and stirred into the mud, being in quantity at the rate of just about 400 pounds to the acre. Four acres were planted in this manner, and the failure may be called a total one. On the 19th of September, I went over the field with the gentleman whose experiments will be described next. There did not appear to be five bushels of handsome corn upon the whole four acres. The stalks themselves were meagre and stinted in height and size.

The causes of the failure are not easy to be discovered. The land was not rich, indeed, but it was land from which the preceding owner usually took about thirty bushels of corn to the acre, when putting on about twelve ox-cart loads of barnyard manure. The amount of acid in the meadow mud was small, very small, hardly coloring the litmus paper with which it was

tested, at all. What a more extended analysis of the mud would have disclosed, making it unfit for corn, cannot be determined. The place from which it was taken, was where it must have received a considerable amount of vegetable deposit, annually, from the falling leaves. The potatoes manured in the same manner, were good. Thirty hills would probably make a bushel,—long reds. Turnips, occasionally found in the hill with the corn, were of great size. The land was loamy—a part of it rather flat, and the water may have stood upon some spots of it, at times. A large part of the field, however, was well situated for corn, and certainly presented no very strong inducement to Mr. C. to try super-phosphate with meadow mud upon Indian corn again. Upon cabbage the effect was good. Mr. C. planted cabbage seed with super-phosphate, and no other manure; and along side of this, he planted cabbage seed without manure of any kind. This experiment was most satisfactory, the super-phosphate giving a fine crop, where, without it, there would have been none. The result is, that upon Mr. C.'s farm, DeBurg's super-phosphate of lime has done well on potatoes, and very well on turnips and cabbage, while, with regard to the corn crop, Mr. C.'s remark was, "I think I have lost one hundred and fifty dollars by my experiment." He believes much of the failure was owing to the mud; but that is not so easy to be determined.

Mr. D.'s farm adjoins the last, and the effect of the super-phosphate of lime upon corn is about the same. Upon the largest part of his corn field of three acres, manured with compost manure, well mixed and made fine by forking over, and applied at the rate of twelve ox-cart loads to the acre, there appeared to be from forty to forty-five bushels of corn—when shelled—to the acre. While on the portion along side of this, with no manure but the super-phosphate of lime—De Burg's No. 1—there would not have been *five*. On the potatoes, the super-phosphate of lime has not done so well for Mr. D. as for Mr. C., but a short distance off; thirty-six hills made a bushel, where the compost manure was put on, but along side, with super-phosphate of lime, and the usual quantity of about 400 to 500 pounds to the acre, it took seventy-eight hills to make a bushel. Mr. D. makes every thing contribute to the compost heap, within his reach. With never more than three

cows, one horse, and two or three swine,—receiving contributions from the sink, the vault, the road-wash, &c.,—he prepares thirty-six good ox-cart loads a year.

The causes of the failure of super-phosphate of lime above mentioned are exceedingly obscure. The following cases present an agreeable contrast.

Mr. E.'s farm being some twenty miles north of the last named, is chiefly sandy land, lying on the bank of the Merrimack River; the field which was the subject of experiment, was a part of a large tract which has been lying common for twelve or fifteen years. Ten years ago it was not even swarded over. Mr. E. thinks the long fallow of ten years did somewhat to enrich it; but it was not till last spring that the enterprising owner commenced his experiments. He then spread on some thirty-two, rather small ox-cart loads of stable manure, considerably mixed with loam, however, and planted it in seven inches deep. Upon one acre of this field he then spread 300 pounds of guano,—Peruvian, No. 1,—and upon the other acre he spread 300 pounds of the super-phosphate of lime. The land was then furrowed three and one-half feet apart, and a tablespoonful of plaster was dropped in the furrows, so as to make the hills about three feet apart. This, however, he thought, proved too near. He dropped six kernels in a hill, but found it one too many, as is always the case when all the seed comes up. The corn came up well, but remained low and small until about the 25th of June. Soon after this, say first of July, it commenced growing, and had a very great growth. On account of the thickness, as he believes, there were many false stalks. From about the 20th of July, however, to the 10th of August, there was no rain, and about one-half was given up as spoiled. The remainder was more moist, and suffered less. The August rains revived much of it, so that only about half an acre was lost by drought; but about the same quantity suffered from the abundant subsequent rains.

The guano had been applied to the moist acre, and the super-phosphate upon the dry. The whole crop was prostrated by a wind about the last of filling time in September. The result was, about ten bushels more from the dry acre, where the super-phosphate was applied, than on the moist one, where the guano was used. There were 184 full bushel baskets of husked corn,

and "the smallest amount of corn unfit to grind," says Mr. E., "that I ever saw from the same amount." Mr. E. thinks he shall try the super-phosphate again, but not the guano. The 184 bushels of ears will make forty-six, of shelled corn.

Mr. E. further experimented to some extent upon his bean crop, with guano and plaster. The yield, however, was small; four bushels to an acre only, partly, he thinks, owing to drought. A neighbor of Mr. E. last year used plaster alone upon beans, and he had five bushels from two quarts of seed, and sold them in August for five dollars per bushel.

Mr. F. first manured his whole field alike and ploughed in. On fifty rows, having about 800 hills, he put half a teacupful of DeBurg's super-phosphate of lime to each hill. Upon all the remainder of his field he applied a good shovelful of barnyard manure to the hill. "The part manured with the super-phosphate," says Mr. F., "is fully equal to the rest. The whole field contained from three and a half to four acres."

On the 17th of April last, Mr. G. applied 300 pounds of guano in a finely powdered state, one bushel of plaster and one bushel of salt, to 150 square rods of land, and sowed one and a half bushels of spring rye. It was a light, sandy soil, heretofore used as a pasture, not yielding, however, he thinks, more than four or five hundred weight of hay to the acre. Unfortunately, on the 31st of July, a large part of the field was beat down by a heavy shower, from which some of it never recovered. On the the 24th of July, however, the crop was harvested, and the yield was fifteen bushels,—being at the rate of sixteen bushels to the acre. Spring wheat was tried upon forty square rods, adjoining the rye, manured with guano, at the same rate, (300 pounds to the acre,) and the yield was at the rate of thirteen and one-fifth bushels to an acre, the crop being three bushels and thirteen quarts. On the remainder of the field, dressed with guano as before, he sowed on the same day fifty-three rods with oats. This crop grew finely, and at harvest stood three feet high on a level, and produced ten bushels and twenty quarts, or thirty-two bushels to the acre. Mr. G. thinks that planting corn and potatoes with guano, plaster and salt, as above, put in the hill, will always be likely to fail; they should be well pulverized, then spread and harrowed in.

The experiments of Mr. H. were made with ashes and guano.

Two pieces of land were taken in the same state; upon one of these he applied 300 bushels of ashes per acre, at twelve and a half cents per bushel; upon the other 350 pounds of guano, at three cents per pound; the first cost of the ashes being thirty-seven and a half dollars, and of the guano ten dollars. The crops are thought by Mr. H. to have been about the same, although he cropped twice where he applied the ashes, and but once where the guano was used. That part of the land which had the guano, had produced not more than twelve or fifteen hundred weight of hay per acre, annually, for some years, but this year he had thirty hundred weight of hay, and of an improved quality. The ashes were put on in the fall, the guano in the spring. Mr. H. thinks that upon onions, one hundred pounds of guano is equal to about six feet of stable manure.

Mr. I.'s experiments were tried with guano and super-phosphate as a top-dressing for grass. It was upon a peat meadow, which had been in grass fifteen or twenty years without any dressing. He applied guano at the rate of 400 pounds the acre to a strip eight rods long, and one rod and five links wide.

The produce of hay was . . . . 253 pounds.
On a strip of same size, alongside (undressed), 56 "
With a super-phosphate dressing on a strip eight rods by one wide, the yield was . . 138 "
The same number of rods alongside, yielded 60 "

To be equal to the guano, the super-phosphate should have produced 210 pounds instead of 138, making the necessary allowance for the quantity of land in the two lots.

Mr. J. put guano, at 300 pounds per acre, against six cords of barnyard manure per acre, for a crop of rye. The guano was upon a gravelly knoll, the manure upon land much better. The quantity produced I have not learned, but says Mr. J., the kernel is about as large as on the part manured from the yard. It should not be overlooked, that we have in no case any test of the length of time that any of these manures will continue to operate.

Mr. K. is exploring a different department. He has subject to his control a dozen privies or more, under each of which he excavates sufficiently for two horse-cart loads of loam, put in once a year. These vaults are emptied annually, and the contents are thrown over at least once a year for two or three

years before using, it being deemed important that it should acquire age. The proportion of loam to that of the night-soil, is about as three to one. This mixture Mr. K. has used as yet only upon grass land, but, says he, "I generally get double, and sometimes treble the quantity which my neighbors do." His opinion is, that guano is not the article for land in the south-western part of Essex County.

Probably the compound prepared by Mr. K. is much the same as the poudrette of the ships, but better because uninjured by any agent used for destroying the odor, in doing which probably the poudrette receives damage.

Mr. L. planted one-fourth of an acre of corn about the middle of May, with no manure but the super-phosphate of lime. The seed was dropped upon the super-phosphate. "The yield," says he, "is about equal to that upon two other fields where I put on from five to six cords per acre of the green manure." About a common handful of the lime was put in each hill.

Mr. M. planted his whole field of corn, containing 2,500 hills, in the following manner. With the exception of four rows, twenty-one hills long, he first put half a table-spoonful of Peruvian guano (No. 1) to each hill, and spread it about with his foot. Half a shovelful of barnyard manure was then put upon that, then a slight covering of soil, and then the corn was dropped and covered. The four rows which had no guano had a fair shovelful of manure to each hill. These four rows ran through the middle of the field from north to south. The crop upon the four rows with a shovelful of manure, weighed as follows, viz.: the two western rows seventy-seven pounds each; the two eastern ones seventy-four and a half pounds each. After this, the two rows with half a shovel of manure and half a spoonful of guano on west side of said four rows, were found to have seventy-seven pounds of corn each, and the two manured in the same way on the eastern side of the said four rows, weighed seventy-one and a half pounds. The whole quantity of guano put on the field was 146 pounds. The whole crop was thirty bushels of sound, shelled corn; the quantity of land was three-fourths of an acre. In dollars and cents the account would stand as follows: Six cords of manure, (amount for three fourths of an acre,) would have cost in the ground, $24.

But only half that amount was used, worth,	$12 00
And 146 pounds guano, and transportation of same,	5 25
	$17 25
Advantage of the guano over the manure this year,	6 75

But the same difficulty as before meets us, viz.: determining the comparative length of time the two kinds of manure will be felt on future crops. As the compost will probably out-last the guano, the apparent balance in favor of guano will be diminished, leaving, however, the labor bill to go against it.

Mr. N. put guano, at the rate of 400 pounds to the acre, upon a strip of grass land one rod wide. The difference could be seen, says Mr. N., fifty rods off: the grass stood from four to six inches taller than that alongside.

Mr. O. spread 400 pounds of guano upon one acre of corn land alongside of this, and twenty ox-cart loads of compost manure were spread to the acre; but the result was not stated.

In describing the farm of Mr. B., (see *ante*,) I omitted his experiments with manures for the purpose of inserting his statements in this part of the report.

Mr. B. deals with manures in no stinted way, and his crops are, accordingly, without stint. He has applied, not less, he thinks, than 200 cords the present year—1856. One hundred dollars worth of stable manure he purchased, and drew it, say five miles. Forty cords of muscle-bed mud were drawn off upon the ice, and about 400 loads of kelp and rock-weed from his beach, make up his amount of sea manure. About 100 ox-cart loads of meadow mud, and thirty to fifty loads from the vaults, both to be had for the taking away, make up the mass applied to his farm. The night soil and meadow mud are mixed in the proportion of one load of the former to three of the latter.

Kelp, stable manure, and barnyard manure, make the compost for the onion crop, being applied at the rate of five to six cords per acre. Stable manure costs five dollars per cord. Wherever Mr. B. has used guano upon his grass land, as a top-dressing, he thinks every 200 pounds has given him an extra ton of hay. Early in June last, a piece of grass put on a rusty appearance and seemed dying. About the middle of June he sowed 200 pounds of guano to the acre upon it. The weather

was rainy, and in about one week he thinks the grass was doubled, being changed in color from yellow to a lively green. And yet the guano seems to have done its great work upon the cabbage crop. A large table-spoonful was put in each hill, mixed with a peck of soil. This was upon reclaimed meadow, once submerged, but now producing 4,000 noble cabbage heads to an acre. He thinks there would have been no cabbage on that land without the guano. Of super-phosphate of lime, Mr. B. has used but little, but intends to buy guano more largely than ever. He also intends buying more meadow land for the purpose of composting it with his other manures. He thinks he has already used more of the meadow muck than any other farmer in the county, and, probably, has.

Mr. P. has succeeded in testing the value of mud from the bottom of a goose and duck pond—a fact which will afford a treat to those who keep poultry of this kind. An artificial pond, of moderate dimensions, kept partially filled with muck and soil, would accommodate large numbers, and the deposits must be of the richest kind. Mr. P. top-dressed ten acres from his pond. At first—either the year before the first application of the mud, or the same year, it is not certain which—the product was eight and one-half tons; the next year nineteen tons, and now thirty. Says Mr. P., "I intend to put all my land into grass, and, hereafter, have no hoed crops at all."

Messrs. Q. and R. have used neither guano, nor any of the phosphates, muriates or alkalies; yet the farm, now their own, but sixteen years ago, when they commenced cultivating it, their father's, and selling only five tons of hay in a year, they have put into a condition to sell forty-five tons, and keep the same amount of stock as formerly, though it is true they have added about ten acres of mowing land to the farm. They make all the manure the farm will admit of, but the great body of it is purchased at the stables and drawn nearly or quite eight miles. They buy about forty-five cords annually and draw it with their own team. By purchasing largely they obtain it at the stable for about two dollars and fifty cents per cord. They always take a return load of manure when going to market with hay. The teaming, if hired, would cost four dollars per cord. In order to determine whether this is a paying speculation, we may estimate the

Five tons a year, sixteen years ago, at $100.		
Forty-five tons now sold at same price, ($20,)		$900 00
Cost of 45 cords of manure at the stable, at at $2.50, ...	$112 50	
As the team on its way home from market can take a load back about as well as not, reckon $2, per cord for labor and teaming, ...	90 00	
Total for manure and labor, .		$202 50
This deducted from the value of hay sold, leaves		$697 50

and gives them a profit of $597.50 above the original product of the farm sixteen years ago.

The manure, on being brought home, is usually laid in a wet hollow, and requires no forking over. In addition to the English hay, they raise from 200 to 300 bushels of corn.

Mr. S. has experimented for two years. In November, 1854, he spread four cords of green manure to the acre from his barn cellar and ploughed it under. It was harrowed in May, 1855, and corn planted with compost manure in the hill, except upon sixteen rows in the middle of the field, of forty hills each. Eight of these sixteen rows were manured with guano at the rate of 300 pounds per acre. The other eight rows were planted with DeBurg's super-phosphate of lime, (No. 1,) a single handful in each hill. "The result," says he, "was a splendid crop of stalks, the corn ripening late." The remainder of the piece yielded fifty bushels to the acre. This was in 1855.

The present year Mr. S. planted his orchard. In May he turned in a crop of clover and planted corn with compost manure in the hill, except nine rows of eighty-four hills each, and running north and south. These nine rows were manured with seventy-five pounds of guano and an equal bulk of plaster well mixed—a handful being put in each hill—the whole field being treated alike in its after culture. The result was as follows:—

Weight of sound corn on the nine rows planted with guano and plaster, ...	797 lbs.

Small, or pig corn on do.,	171	lbs.
Total,	968	"
Weight of sound corn on nine rows of same length on the west side, with compost manure,	1,131	"
Small, or pig corn,	44	"
Total,	1,175	"
Weight of sound corn in nine rows on east side, with compost manure,	1,098	"
Small, or pig corn,	43	"
Total,	1,141	"

Here it is plain, that this amount of guano is inferior in its effect on corn to the compost manure. The land selected in the experiments was similar throughout. A query may arise whether an increased quantity of guano would not have made the crop equal to that planted with compost, even diminishing the proportion of pig corn, which was large. Mr. S., however, is of opinion that both guano and super-phosphate of lime are better as top-dressings than for field culture. For the accuracy of the experiments, Mr. S. is a pattern for all farmers. Nothing is so reliable as the weight of the crops in showing results.

Mr. T.'s enterprise has led him somewhat beyond the use of guano. Repudiating super-phosphate of lime, yet having great confidence in bone as a manure, he has tried the fresh ground bone with satisfactory results. There are those who can see nothing but the lime derived from bone, and who would consequently be satisfied with bones that have bleached, till every particle of animal matter has evaporated. Mr. T., by using the fresh bone, derives a benefit from the animal matter, which is not to be overlooked. All know the potency of damaged meat or fish, as a manure; and whatever there is of this quality in fresh bone, ground, must increase its value over the super-phosphate of lime.

In August, 1855, Mr. T. applied 300 pounds of guano and 500 pounds of ground bone to one acre of ploughed land, and harrowed in with the iron tooth harrow; sowed hay seed, but it did not start till the rains in September. The hay crop, now

finely headed Herds-grass, in the barn, was only ten months from the seed.

Some of the experiments of Mr. T. being still unperfected and in progress, can only be alluded to. Thus, on his barley field, he sowed 300 pounds of guano to about two acres, immediately after the barley crop was off last year, and 100 pounds of guano were put upon an acre at the time of sowing barley this year. Perhaps it is asking too much, but if the farmers of the county, when trying some new manure upon a given piece of land, would take the trouble to leave a piece adjoining it where it is not applied, for the important purpose of determining just how much advantage is derived, if successful, or how much loss is sustained if unsuccessful, it would not take many years to settle and establish some of the most important facts in the agricultural world.

But to return. Mr. T.'s experiments with ground bone and guano combined, appear to great advantage upon a two acre lot, a part of which was never ploughed till the fall of 1855. Upon that lot he put 600 pounds of guano and 1,100 pounds of ground bone well mixed. It was harrowed in and sowed down to grass. I saw the stubble on the 20th of September, 1856, and if it had had forty ox-cart loads of well pulverized barnyard manure put upon each of those two acres, it could not have looked better. As the hay had not been weighed, the quantity could not be accurately determined. Two tons per acre for the first crop would be a fair estimate. As for the durability of this manure, it promises well. Mr. T. says where applied to trees five years ago, the effect is still to be seen.

Another two acre lot Mr. T. has dressed with ashes, for which he paid eighteen dollars, with the addition of some barnyard scrapings. After three croppings it still looks vigorous, and as if two or three croppings more would not exhaust it.

That 300 pounds of guano to the acre is not the maximum quantity which may be safely used, has been shown by Mr. U. upon a crop of onions. He put in 400 pounds per acre before sowing, and from 400 to 500 more after the crop was up—sown broadcast. This fact is furnished by a reliable neighbor of Mr. U. who was unable to state the amount of the crop.

Mr. V. applied 400 pounds of DeBurg's super-phosphate of lime per acre to corn, planted side by side with the remainder

of his field, manured in the usual way, but was entirely dissatisfied with it. "I could see no effect at all," said he. Mr. V. has, however, made one application to corn, which must be classed with manures, although it operates only as a stimulant, or generator of heat, which is a discovery of his own, and so far, is, probably, confined to himself, but which is worthy of some attention. He applies it to all his corn, when the price of the article will admit of it, though more especially to cold lands, or on the occasion of late planting. He has this year used 250 bushels of shorts, costing seventeen cents per bushel, giving a large half pint to each hill of corn. Its use is to start the corn and carry it rapidly through its tender stage, when the birds and worms are most destructive. It generates heat powerfully, and, simple as it is, will kill the seed in contact by burning it. He applies it by hand, then spreads and covers it with the foot, and the seed is then dropped. In order to make the experiment satisfactory to himself, he left two rows otherwise manured like the rest of the field, without the shorts. The difference was apparent through the season. One of his fields was planted as late as June—the day not recollected—and upon wet heavy land. When visited by the undersigned, September 3d, it seemed quite up with corn planted at the usual time in the usual way. Mr. V. does not think its effects confined to the matter of producing heat, but, that as it decomposes it becomes itself a manure. He prefers it to guano for giving corn a start. It is certainly worth the attention of farmers cultivating cold or wet land. Probably the bran of other grains would answer the same purpose, and by being preserved through the year, would, in many families, accumulate to an amount sufficient for use. It is matter of deep regret that the limits of this report forbid a full description of the farming operations of Mr. V. His buildings, and all the arrangements of the farm, speak volumes in favor of his style of farming, but cannot be enlarged upon further here.

Mr. W. has applied Gould's muriate of lime, at the rate of about 400 pounds per acre. He used it upon corn, potatoes, turnips, onions, beets and other vegetables, but was unable to perceive any effect whatever.

Mr. X., however, used the same manure upon his beds of strawberries with the grandest results, although the experiment

was not made in such a manner as to determine how much more was produced with it, than could have been without it.

Mr. Y. gave a full statement of his farming operations, and I only regret that I cannot enrich this report by inserting it in full. When the rent of any farm has been raised from $145 to $350 in seven years, and is made to pay the tenant well besides, then the farming public want to know how it was done. The dung heap, however, will be found to tell the whole story, and that, with neither phosphates, muriate nor guano. And with all the intelligence and well directed skill of Mr. Y., he probably pays but little attention to the matter of oxygen, hydrogen, nitrogen, carbon, phosphorus, potash, or soda. Mr. Y. has been operating nearly seven years to great advantage upon a hired farm, with forty-eight acres of tillage, and fifty of salt marsh. Although much of his manure comes from the farm beach, yet he has purchased ever year sometimes from twenty to fifty loads of night-soil. He has used as much as 500 ox-cart-fuls of well mixed compost manure in a year. The whole success of Mr. Y.'s farming, he himself refers to heavy manuring and deep ploughing. He does not call it ploughing, if less than ten inches deep, and his rule is oftener twelve. This statement is of course destitute of the interest it would have had, had careful experiments been made with different kinds of manure, even where none of the concentrated fertilizers have been employed.

Mr. Z. informs me by letter that he has made diligent inquiry in his vicinity, quite remote from this, for experiments in manures. One gentleman has tried both guano and super-phosphate of lime, and is well satisfied with both; but the letters of the alphabet having entirely failed me, my report must expire for want of breath.

I cannot sufficiently express my thanks to the five and twenty or thirty gentlemen who have listened to, and answered my inquiries, generally on the spot, and waiting patiently while the whole could be written down, or, as before mentioned, in many cases by letter.

Should any who have contributed to this report find errors, as they probably will, let them do me the justice to believe they are errors of infirmity, and not of intention; and for those gentlemen who have borne the expenses of travel incident to

this partial survey of nearly half the towns in the county, let me hope they will have as little regret for their part of it as I feel for mine, in which case the account will balance well.

DAVID CHOATE.

MIDDLESEX.

Report of the Committee.

The committee on farms and orchards report that there were two farms and five orchards entered for premiums, of all of which I have made a thorough examination; and in this county, which abounds in good orchards and farms, I am sorry to say there are no more offered in competition for your premiums.

In travelling over our county, I have noticed a rapid improvement in agriculture and horticulture, in the large and commodious barns and convenient cellars under the same for the storage of roots and manure, the well cultivated gardens, the thrifty orchards, the large tracts of reclaimed meadows, almost rivalling the bottom lands of the west in fertility, the increased attention given to planting trees in our streets, and in ornamenting the old homesteads with the various beautiful trees, shrubs and flowers of our climate, thereby making the home of the farmer attractive and beautiful as well as profitable.

The farm of Mr. George Chandler, of Shirley, I found to be in the following condition: Buildings in good order; good cellar under the barn, and loam and muck under the same to absorb the liquid manure; the land divided into convenient lots, and fenced by substantial stone walls; the mowing and tillage lots cultivated clean to the walls, and no brush or weeds growing near the same; corn, potatoes, carrots, and other crops, looking very well. If Mr. Chandler's statements are true, which your committee see no reason to doubt, this farm, which he purchased eighteen years ago, and was then in an almost unproductive state, without any, or very poor fences, and covered with brush, the soil filled with rocks and cobbles, now presents to the eye smooth fields, good crops and fences, and would be a credit to any farmer in our county.

The farm of Mr. L. H. Hildreth, of Westford, was next examined. The soil is a gravelly loam, filled with rocks and

hard to cultivate. Mr. Hildreth has increased the productiveness of his farm very much, as will be seen by his statements, which are annexed. I also required answers to various questions which may be found in the communications from these gentlemen.

The orchard of William Buckminster, Esq., of Framingham, is in a fine and thrifty condition, every tree being of nearly the same size; and although they have been planted only four years, many of them are from twelve to fifteen inches in circumference one foot above the ground; the bark is smooth and healthy, the rows perfectly straight, and the limbs branching at the same distance from the ground, about five feet; tops nearly of the same size, very much alike, and altogether, presenting a very fine appearance.

The orchard of Mr. Horace H. Bigelow, of Marlborough, is also in a good condition, as thrifty and nearly as large and even as Mr. Buckminster's.

The orchard of Mr. White, of South Reading, was thrifty and in a good condition, not as even as Messrs. Buckminster's and Bigelow's, and having been planted since, the trees are not so large.

Mr. ——— orchard is in about the same condition as Mr. White's.

In Mr. Edmund E. Wiley's orchard, a part of the trees look pretty well, the rest do not.

After a careful examination the committee recommend that the society award the following premiums:—

The first premium of $25, to George Chandler, of Shirley.

The second premium not awarded to Mr. Hildreth, he having received the second premium in 1852.

On orchards, the first premium of $12, to William Buckminster, of Framingham.

The second premium of $10, to William White, of South Reading.

The third premium of $6, to Cyrus Wakefield, of South Reading.

Mr. H. H. Bigelow would have been entitled to the second premium, had he not already received the same on his orchard in a former year.

Respectfully submitted,

JOHN B. MOORE.

Statement of George Chandler.

In obedience to your call, I proceed to answer the questions you have propounded in relation to my farm and its management.

1. "Of how many acres does your farm consist, and when did you purchase the same?"

Ans. My farm consists of forty-seven acres, and I purchased it in the spring of 1838.

2. "What was the condition of the land at that time?"

A. The land and its fences were in a poor condition; the amount of hay which I cut the first year, being only sufficient to winter six cows.

3. "What proportion was tillage, pasture and wood?"

A. Thirty acres were devoted to mowing and tillage, and there were nine acres of pasture and eight acres of wood?"

4. "What amount of hay was cut then, and what amount now?"

A. See answer to second question. I now winter thirty head of cattle from the proceeds of my farm.

5. "What grain do you raise?"

A. Oats and corn, they being best adapted to my soil.

6. "What roots do you raise, and what value do you place upon them for stock?"

A. Last year I raised one hundred and forty bushels of potatoes; two tons of carrots; one ton of beets; one hundred and forty bushels of flat turnips; and four hundred heads of cabbage. I consider these, a highly valuable food for cattle, both in promoting growth and healthfulness.

7. "At what time do you seed down grass land; in spring, or in autumn, and at about what date,—kind and quality of seed?"

A. I seed my grass land, both in spring and fall, with clover, Timothy, and redtop. I put upon the acre about eight quarts of Timothy; eight quarts of redtop, and six pounds of clover.

8. "What time do you apply top-dressing to grass land?"

A. In September, I top-dress my grass land with compost manure.

9. "How do you apply manure, composted or not, ploughed under, or on the surface, and what quantity, per acre?"

A. See previous answer. I spread uncomposted manure,

broad-cast, on my ploughed fields, and turn it in, about twenty loads to the acre.

10. "Do you use guano, or other special manures, and with what results? the same of lime and plaster?"

A. I have used guano with variable success. Lime and plaster I have never applied to my lands.*

11. "What course do you pursue in draining, open or underdrains, and how made?"

A. I have drained all my wet soil with the common open ditches, taking care to keep all obstacles removed, so that the water may always have a free passage.

13. "What depth do you commonly plough? Do you use the subsoil plough?"

A. I plough my land eight or nine inches deep, and have never yet subsoiled.

14. "Have you reclaimed bog meadow, and how?"

A. I had a piece of hard swale land, containing one and a half acres, which, in May, 1849, I inclosed with a suitable fence, and put upon it twenty swine, which I bought from a drove, thinking that they, with the implements nature had furnished them, might pulverize a soil too wet to be cultivated by the usual process. This they did with strict fidelity. The hogs remained upon the land seventy days, when their work was finished and they were removed. The land was harrowed, and stones enough removed to build sixteen rods of wall. It was then drained and sowed with redtop and Timothy, and in the spring with clover. Ever since, there has been a large harvest of hay realized from that ground.

The first cost of the swine was	$76 00
While on the land they were fed with one bushel of dry corn, per day, ...	42 00
The expense of supporting them afterwards until disposed of, was	25 88
Making the whole expense, ...	$143 88

They were sold for $152.62, leaving a net gain of $8.79.

15. "How much live stock do you keep, and what breeds?"

* The best way to use guano is to apply it to corn at the weeding season, about one hundred and fifty pounds to the acre. I intend, invariably, to use it in future, even though it cost five cents per pound.

A. I keep cattle from three years old and under. They are heifers, taken at the age of about a week, and returned to their owners with a calf, of the same age, by their side. They are sometimes three years old when they come in, but generally are returned at two years old.

16. "Do you employ oxen or horses, and which do you consider best?"

A. My team is made up of horses, which I consider best adapted to my purpose.

17. "How much butter, and cheese and milk, do you produce?"

A. See the answer to the fifteenth question.

18. "What fruits do you raise?"

A. Apples, pears, peaches, cherries, currants and quinces.

19. "What do you consider the best and cheapest fences?"

A. For my farm, stone wall is much the best and cheapest. I have built five hundred and twenty rods since I owned the farm.

20. "Do you consider the careful cultivation of a garden, essential on a farm?"

A. A kitchen garden is not needed when one cultivates the field roots and vegetables, that I do.

21. "Is there profit in raising swine?"

A. I think there is, when a proper course is taken.

22. "What orcharding have you, apple, pear, peach or plum?"

A. When I took possession of my farm I had very little select fruit, but trees enough, in a natural state, when in bearing, to make twelve barrels of cider. These I have ingrafted with the different kinds of market apples, and have planted eighty-six new apple trees, most of which are in a bearing state. These, together with the other fruits that are named in the answer under the nineteenth question, have brought me an annual income of two hundred dollars.

23. "What distance from each other do you set your trees?"

A. Thirty feet.

24. "What do you wash your trees with?"

A. With a strong solution of ashes.

25. "Do you keep them under cultivation? If so, with what crop?"

A. I keep them under cultivation, with root and corn crops, until their foliage becomes so dense that no crop will grow: I then plough the ground and leave it fallow.

26. "Do you think that old orchards may be new topped and cultivated with profit?"

A. I do.

27. "Do you keep a journal of your farm operations?"

A. I do.

28. "Any other information, that you may possess about farming or gardening?"

A. I have given a portion of my experience in a paper published in the "State Transactions of the Agricultural Society for 1850," pages 128 to 131, to which you are respectfully referred.

SHIRLEY, Sept. 16, 1856.

Statement of L. H. Hildreth.

The farm to which I called your attention, I purchased in 1843, it being then very much run down, having been let two years prior to my purchase, to a man who well understood the process of skinning. For three years before, the standing grass had been sold, so that it was not in the best head when he came on to it. He, however, left it in a very low state, from which, with judicious and careful nursing, it has not yet entirely recovered, although I think it is gaining, and hope, should I live on it a few years longer, to restore it to a healthful and vigorous condition.

I labored under one disadvantage in my purchase and subsequent movements, that I hope few of my brother farmers experience; that was poverty. I can see a thousand improvements that I wish to make, but from which I am held back for want of means.

I paid for my farm $4,337. To make that payment, I was obliged to mortgage it for $4,100, having but $237 of my own, after buying seven cows to stock it with, and my few farming tools. I thought then, and still think, that a young man, by industry and calculation,—if he has as good a wife as I have,—can make a living, improve his farm, and bring up a family of children, be able to educate them well, pay his taxes, help pay the minister,—if he likes him,—and lay up something for his

old age, after running in debt for the whole. Still, it is up-hill work, and if he wishes to make any improvement on his farm it must be very gradual. Mine has been so much so, that I have to take a retrospective glance through a series of years backwards, to make it visible.

Still, by doing so, I can see that whereas, when I bought I cut only hay enough to keep seven cows and one horse through the first winter, I now cut enough to keep four oxen, twenty cows and one horse, from the same land. That while the first year I made but fifty-two loads of compost manure, I now make, or have, by my cows, the last year, made three hundred and eighty-two loads of a better quality.

That, notwithstanding, my buildings, when I came here, were wofully out of repair, many of my fences only baits to teach honest cattle to jump, and my orcharding in bad condition, I can see that all these things are vastly improved; and, considering the limited means I have had at my command, I am perfectly satisfied with my exertions and the results. I would close this part of my statement by giving a due amount of credit to my wife, who has truly been a helpmate to me at all times, assisting, encouraging and cheering me, as only a good woman can, her husband. I now proceed to answer the questions proposed. [For questions, see Mr. C.'s Statement.]

1. Eight acres of my home farm and ten, each, of woodland and brook meadow, at a distance of one mile from my house.

2. In 1848 I think my farm was in better condition than in 1843, when I bought it; I hope it is better now than it was then.

3. Thirty-five in tillage, twenty-five in pasture, and twenty in woodland.

4. I do not remember the amount in 1848. The present year I have enough to feed amply twenty cows, four oxen and one horse through the winter.

5. Corn and oats mostly, although I am this fall growing considerable wheat and rye.

6. Some years carrots to a considerable extent. This year I have about six or seven acres in flat turnips, which are a very cheap root, if not a valuable one. I am in hopes, from present appearances, to get a good crop.

7. I seed with clover, both spring and fall. In the spring, as early as it will do to plough. In the fall, I seed in August and

September with winter wheat and rye, or if I turn over to seed, alone. Quantity of seed, one peck of Herds-grass, three pecks of redtop and eight pounds of clover.

8. My plough-land is mostly covered with orcharding. I turn over the sward often, and manure as highly as I can, therefore, I very seldom top-dress, unless on my reclaimed meadows. To these, I apply my manure in the fall, and spread and roll, that the lumps may be broken up, the land levelled, and thus receive the strength of the manure.

9. I compost nearly all my manure, deeming it much better pulverized, and in a fitter state to give out its strength to the roots of plants. My land is mostly heavy. I apply the manure on the top of the furrow and incorporate it with the soil, by means of the cultivator or harrow.

10. I have used it to a considerable extent for the last ten years, but am now using super-phosphate instead, and prefer the latter.

11. Plaster I used in former years, and thought it a valuable stimulant; of late, it has not seemed to improve the feed in my pastures, and I have stopped using it. Oyster shell lime, I have burned and used to a large extent, mixed with salt and peat, thus destroying the acid in the peat, and making what I consider a valuable compost, especially for fruit trees, either with or without stable manure.

12. Covered drains. I have many small stones on my land; double wall made of them I abhor: I therefore fill up my ditches, which are made three and a half or four feet deep, and as wide as is needful to receive them, to within one foot of the surface, making the drain at the bottom by laying down cobbles and covering with flat stones. I then level off with the dirt thrown out, and draw the remainder to my yards or barn cellar, to compost with my manure.

13. At the first ploughing, from eight to eleven or twelve inches, as the land will admit, with a double Michigan plough. I have used a subsoil plough to some extent for the last eight years, and should prefer it to a double plough, did it not require an extra team.

14. I have reclaimed bog meadow by taking off the sward, planting for two years, with manure, and then seeding down.

15. I have now, four large oxen and one horse. I summer

seven or eight cows, and shall keep through the winter nineteen or twenty, selling my milk. I have now, two hogs.

16. On my farm, I use oxen for farm work. Were my land free from stones, I should use nothing but horses. Oxen are too slow for a live Yankee, where horses can be worked.

17. I sell my milk in the summer for eighteen cents a can. My milk bill, monthly, has been, this summer, about $30, from five cows, the rest coming in this fall for winter cows, and those I have milked, part of them, coming in, in January and February. In regard to the income this winter, I cannot answer, not knowing what I shall receive per can.

18. Apples, peaches, pears, plums, apricots, quinces, cherries, cranberries, currents and strawberries.

19. Stone walls.

20. I answer yes; but precept and practice do not go together with me, as they should do, in this respect.

21. Growing pigs need milk. Nothing seems to me to be so suitable for them as this article. I therefore believe that the farmer who sells his milk, better keep no more, at the price at which pork has sold for the last eight years, than enough to eat up the waste articles and the swill that is necessarily made in the family.

22. I have about eight hundred apple trees, little fruit this year; forty-five or fifty pear trees, fair crops; two hundred and twenty-five peach trees, bearing well; forty-five or fifty cherry trees, good crops; fifteen or twenty plum trees; the curculio took the plums. A few apricots, quinces, chestnuts, &c.

23. Apple trees, twenty-five to thirty feet, and peaches and cherries, fifteen feet.

24. I do wash them; sometimes with whale oil soap suds, sometimes with potash water.

25. My orchard is so extended that it is impossible to keep the whole in constant tillage; I therefore endeavor to keep it ploughed and planted, or sowed, about half the time, say three years up and three years to grass. I now speak of my apple orchards. I have found by experience that the Baldwin suffers the least by neglect, and would, therefore, advise any man, setting out an orchard that he intends shall take care of itself, to be sure and get Baldwins. He will find, however,

that even the Baldwin will pay him rather poorly, under such a course of treatment, or rather, no treatment at all.

26. I do decidedly. If half the money invested in young trees was devoted to a judicious renovation of the old trees on our farms, I know from experience, it would bring double the money into the pockets of the owners. I have tried both ways, having set out two apple orchards within seven years, one of ninety-eight and the other of one hundred and forty-nine trees. They have grown well and are thrifty, but I do not receive one-half the dollars from their fruit, that I do from the same amount expended in trimming up and grafting old and unsightly trees, that were formerly an eye-sore to the passer-by, and which now, almost yearly, hang bending under a load of fruit. I would say to every man having old and sickly-looking trees, trim and graft, graft all. Some may die! What then? Cut them down for firewood, but never cut down an apple tree that has been growing, perhaps fifty or one hundred years, till, according to Scripture, you have dug about it and pruned it, not only last year, but this year also.

27. I do. I use Marsh's, ruled and marked for each day in the year. This space, a dozen lines each day, perhaps, affords me room enough to keep my farm journal, and also note any remarkable events that I wish to remember. In this, also, I formerly kept a debtor and creditor account with every crop raised, but finding it inconvenient to foot up the charges, they sometimes extending over a number of months, as in a hoed crop for instance, which would have to be continued from spring to fall, I have lately opened what I call a "farm book," in which I devote a page, or less as it requires, to each field planted, charging the land with manure, labor, and every thing in fact that I sell from the land, and on the other hand giving it credit for all I take off. I shall continue to follow this course from one breaking up, through the hoed and grain and grass crop to another, and can then tell at a glance, how I stand in regard to each piece of land and the crop. The labor is not great; a few minutes each evening completes both books for the day, and I make it just as regular a business to attend to it nightly, while the day's work is fresh in my mind, as I do to wind up my watch before I go to bed. I believe, if our farmers would generally adopt this, or a similar course, they would be benefited, and also

interested in sometimes referring to their diary of former years. I can tell what I, or any of my hands have done, by taking up my diary, in any day for the last three years.

Thus I have answered all the questions propounded. I have done so as briefly as possible, and still I have covered more space than I meant to do. Almost every question is a text, from which a good sermon could be preached. They will be beneficial by setting our farmers to thinking.

Westford Sept. 15, 1856.

WORCESTER WEST.

Report of the Committee.

The committee have been called to visit but one farm during the past year, and that is owned by Mr. David Bacon, of Barre. Mr. Bacon is a good farmer and is worthy of much credit for his management and success, which the general appearance of his farm indicated at the time the committee visited it. He has made many valuable improvements, and is now receiving the benefit of them. Although Mr. Bacon has made improvements on his farm, there is still room for more. As he received the society's second premium in 1852, the committee did not feel at liberty to award him the first at this time. They consider the premium offered by the society as an inducement to stimulate the farmer to make permanent improvements on his farm, not only for his own benefit, but for those that come after him. As for instance, clearing his fields of stones and making them much more productive and easy of cultivation, making good and substantial inclosures, setting out a variety of fruit trees, and not forgetting the ornamental. These are improvements that will not only give the one that makes them pleasure, but add to the happiness of multitudes that come after him, in plucking the golden fruit fresh from the trees and sitting beneath their shade. It is a fault with too many farmers that they are unwilling to make any improvement unless they are quite sure of receiving their pay immediately for the outlay. Under such circumstances we see farms too often, that are much neglected, buildings and fences in very bad condition, and

almost entirely destitute of fruit of any kind, although a good orchard pays a much larger profit than any other part of a farm, according to the expense. When, with a suitable degree of enterprise and good calculation, they can have their farms and buildings look neat and attractive, and be supplied with an abundance of choice fruit. What is more beautiful, to one who is fond of cultivating mother earth, than to see a neat farm with buildings well arranged and in good order, with handsome fields well inclosed. We are very sorry to see so little interest manifested by the farmers in entering their farms to compete for the premiums offered by the society, when it is a fact that all, or nearly all, that is exhibited at our shows, comes or receives its support from the farm. If a man manages it well, makes it productive and pleasant, he generally has stock to correspond with his farm.

If the premium offered is not sufficiently large to induce the farmers to enter their farms, I say enlarge it; for the farm is the foundation of all our exhibitions and ought to receive sufficient encouragement to induce competition with other parts of our exhibition.

A description of Mr. Bacon's farm, together with a statement of its products, is herewith submitted.

BENJ. F. HAMILTON, *Chairman.*

Statement of David Bacon.

My farm contains one hundred and three acres; about twenty-five in wood, and seventy-eight under improvement. The valuation on the assessors' books in 1855, was $3,200; interest on which is, $192.

The number and value of my stock is,

1 horse,	$150 00
2 oxen,	150 00
10 cows,	400 00
6 yearlings,	66 00
	$766 00
Interest on stock,	$45 96
Interest on tools, blacksmith's bill, &c.,	30 00

Interest on farm,	$192 00
Amount paid for labor,	200 00
	$467 96

The produce is as follows:—

3	acres corn, 165 bushels,	$156 00	
¾	acre corn fodder,	25 00	
65	bushels potatoes,	32 50	
140	bushels oats,	63 00	
95	bushels onions,	66 50	
90	barrels apples,	208 00	
38	bushels carrots,	5 50	
600	bushels English turnips, at 10 cents,	60 00	
650	pounds cheese, at 10 cents,	65 00	
300	pounds cheese, at 8 cents,	24 00	
350	pounds of butter, at 25 cents,	87 50	
9	calves,	81 00	
Eggs sold,		4 74	
Pears and peaches sold,		9 00	
2	tons of hay sold,	20 00	
Keeping cow by the year,		30 00	
Cattle sold,		225 00	
3	bushels beans,	6 00	
10	bushels rye,	10 00	
30	tons good hay,	300 00	
5	tons swale hay,	25 00	
3	tons corn stover,	12 00	
2	tons straw,	10 00	
			$1,515 74
	Deduct expenses,		467 96
			$1,047 78

I find, in striking the balance, that it leaves too large a sum, as most reports of this kind do. I now will state what I think I shall have to spare besides, what I shall consume on the farm. As I was unfortunate with my cows the past season —they came in late—I think I shall make one hundred dollars more from them than what I have stated in my report above. Allowing four hundred dollars for myself and wife, is about

all, I think, there will be left. I am not doing much in making butter and cheese ; I am raising some stock and making some beef; I make some butter, and raise my calves on skim-milk ; I have averaged about $225 per year, for three years past, for cattle that I have raised in the above way. I came on to my farm in 1845 ; the farm at the time was somewhat run down : all the hay that I cut on the farm for the two first years, would not exceed eighteen tons per year. The fruit on the farm the first five years, would not exceed twenty dollars per year. There were no pears, peaches or plums on the farm, fit to use, of any amount ; I have grafted about one hundred apple trees, set out about twenty pear trees, quinces and peach trees, for the last three years. I have budded about twenty peach trees, and set out and grafted ten apple trees, the last two years ; have set out and grafted fruit trees more or less, every year since I came on to the farm. I have made one hundred and fifty rods of stone wall, and now set about one hundred more ; I have blasted the rocks out of about twelve acres. I turned over three acres of grass land last spring, without any driver, with one yoke of oxen, spread on about seventeen loads of long manure to the acre, and put about twelve loads of compost into the hill. I raised, by estimation, fifty-five bushels of corn and five hundred bushels of turnips. All of which is respectfully submitted to the committee.

Barre, Nov. 1, 1856.

HAMPSHIRE.

Statement of Ansel A. Rankin.

My farm contains one hundred and fifteen acres, of which seventy-five are mowing, tillage and pasture, and the remainder unimproved, but not unimprovable. I have entered it for the Hampshire Society's premium of sixty dollars, for the best managed and most improved farm, during five successive years, commencing with 1855. My improvements, during the year past, have been made in addition to the ordinary annual culture. I have commenced a process of reclaiming some worn out pasture and swamp lands, have laid twelve rods of new stone

wall, and have set out some fruit trees for a nursery. I have endeavored to save all the animal and vegetable materials for manure, which could be found on the farm, and have used no other manure except 400 pounds of plaster. The assessors' valuation of my farm is $2,100.

Products of the farm:—

20 tons of hay, at $12,	. . .	$240 00	
50 bushels of oats, at 50 cents,	. .	25 00	
15 " " rye, at $1,	. . .	15 00	
150 " " potatoes, at 25 cents,	.	37 50	
50 " " corn, at 90 cents,	. .	45 00	
22 " " carrots, at 25 cents,	. .	5 50	
14 " " turnips, at 20 cents,	. .	2 80	
1 ton of rye straw,	. . . .	5 00	
$2\frac{1}{2}$ tons of oats, at $6,	. . . .	15 00	
3 tons corn fodder,	. . . .	12 00	
Green corn fodder.	. . . .	12 00	
5 loads of pumpkins,	. . . .	5 00	
Pasturing,	. . . .	50 00	
Garden vegetables,	. . . .	10 00	
Apples,	. . . . .	15 00	
3 bushels of white beans,	. . .	6 00	
		———	$500 80

Expenses:—

My own and hired labor,	. .	$142 00	
Interest on valuation,	. .	126 00	
Taxes,	. . . . .	29 29	
Seed,	. . . . .	12 33	
		———	309 62
Surplus profits,	. . . .		$191 80

PELHAM, June 1, 1856.

Statement of Theophilus P. Huntington.

My farm in Hadley, near the Connecticut River, contains twenty-six acres, under constant culture: twelve acres of light, sandy soil, that have been cropped about one year in four, and

eleven acres in wood. Some portions have been recently reclaimed. The attempts to enrich my light, sandy soil, proved failures and worse than failures—mere robbery of the more valuable parts of the farm—until 1855. I then applied to three acres a thousand pounds of guano, and harvested a crop of more than a hundred bushels of corn, which was worth more than the land could have been sold for in the spring. I have made experiments in raising broomcorn, without the use of manure from the farm, by substituting phosphates. I succeeded, the past year, in getting a fair crop, with only one hundred pounds to the acre applied in the hill; but twice that quantity might be better. My theory is, that the stalks, which are ploughed in, and the phosphate, will restore all that the crop has taken from the land. If our valley farmers can raise broomcorn with phosphate, and good crops of Indian corn and other grains on light, sandy soils, with guano, their grass lands can have the benefit of all their home made manures.

For a more particular description of my farm, I refer to my statement published in Secretary Flint's "Agriculture of Massachusetts," for 1854, pp. 40–45; also to the Transactions of the Hampshire Society for the same year.

HAMPDEN.

From the Report of the Directors on Farms.

In presenting a statement of our doings, and of the affairs of the society, it affords us much pleasure to notice the greatly increased interest of the present over that of any former year. Never, since the formation of the society, has there been so large a number of new members added to the list, as the present year.

A beautiful and valuable lot has been purchased in a very desirable location, for the use of the society, and we believe to the entire satisfaction of its members.

Another item of interest and improvement is the unusual number of farms entered to compete for the premiums offered by the society. During the eleven preceding years, since the formation of the society, only four farms have been offered for premiums; but the present year, we have nine entries. At the last annual meeting, a new feature was instituted in this depart-

ment, by the offer of a single premium of fifty dollars for the best conducted and most improved farm, during the ensuing three years, taking into view the entire management and cultivation for that period, including lands, buildings, fences, orchards, crops, stock, and all other appendages, with statements in detail relating thereto.

Many of our intelligent farmers, fully aware of what a model farm should be, have declined entering into competition with each other, for the year, for the reason that their contemplated improvements require a series of years for their perfect development. As the result of this offer of premiums, six farms have been entered, three of which have been visited and examined by the directors, and statements, more or less complete, are received from the respective owners, and are herewith submitted.

The directors feel that no ordinary task devolves upon them, the requirements of the society being such, that each farm entered for one year must be visited twice, and those for three years, once in the first two years, and twice in the last year. Yet we have no hesitation in saying, that while our visitations have been pleasant, (and we hope profitable to ourselves,) much real good has been gained for the cause for which the society was organized, by enlisting in competition the farmers and the farm improvements of the county, and we earnestly recommend the continuance of this, or a similar system, as one of the best means of promoting the interests of agriculture, and the welfare of the society.

Capital invested in farming, is limited in New England. Many young farmers have none to invest, and those who have are too much disposed to invest it in some other business, or put it on interest, while their lands, being unduly drained of their products, and no return made to them, are becoming unproductive. That capital, skilfully invested in farm improvements, will pay a better percentage than the average of other business, has been clearly proved by repeated experiments.

But the most important question to be solved, is, how can improvements be best carried on without capital? In awarding these premiums, the society should aim to encourage those improvements which will yield the largest income on the capital invested. In no better way can this be done, than by a full

statement from each competitor, enumerating all his improvements, the manner of conducting them, the variety of crops, soils, &c. The society requires such statements, and we have no doubt that much benefit will result therefrom.

Farms were entered for one year as follows: By J. H. Demond, of Springfield, containing forty acres; by Harvey Wolcott, of Agawam, containing one hundred and fifty acres; and by Dr. Lawson Long, of Holyoke, containing thirty acres. These farms have been visited by the directors twice, during the past season. All of these competitors deserve credit for the high state of cultivation to which they have brought their lands, and for the skill and success with which they have cultivated them. When all the capital and labor employed in farming shall be as judiciously and systematically applied as upon their farms, then will the results be more satisfactory, both in pro ducts and profits.

Mr. Demond's valley farm is in the "garden of New England," the alluvial bottoms of the Connecticut River. For a description of his land, and his management of it, with an account of his crops, profits, &c., the reader is referred to his subjoined statement. We will only add, that any person will feel well compensated in visiting his grounds at any season of the year. Well tilled fields, luxuriant crops in regular mathematical order, and sleek kine that seem abundantly satisfied with their lot, impress the visitor with the conviction that the enterprising proprietor perfectly understands his business, and adopts the true system of farming, by directing his attention to one branch, and following it until success crowns his efforts. His arrangement for making manure enables him to produce more, and of a better quality, than is often made on farms four times as large, with double the amount of stock. The directors were unanimous in awarding to Mr. Demond the first premium of $25.

Statement of J. H. Demond.

I present the following statement of the Valley Farm, to the directors of the society. It contains forty acres, known as the Connecticut River land. The first portion, seventeen acres, I purchased in 1847, and the remainder at different periods since, but all of it in a worn out state. The larger part being owned by people residing in the city proper, they carried away the

crops, but returned very little to benefit the soil. For two years I did but little to the land, being otherwise engaged.

In 1849, I commenced farming for myself, with one pair of horses, valued at $115, and six cows, valued at $210. There was a small barn on the land, but no other buildings, and no fruit. I commenced by setting some seven acres to fruit trees, mostly apples of choice varieties, placing them forty feet apart. In 1849, I built a house, and the year succeeding I moved my barn, remodeled, and made such additions to it as to enable me to keep my cows in the basement, a cellar being dug in the rear of them so as to receive the manure, from which I make, annually, some four hundred loads of compost, worth $400, by putting earth in a trench, daily, in the rear of the cows, thus absorbing the urine, and making a very valuable manure, which I recommend to farmers for trial, in preference to guano.

My stock numbers at present twenty-two head, cows and heifers, one bull and a pair of horses, all at present valued at $1,900. My land produces sufficient to keep this stock, with the exception of $75 paid for pasturage, and $200 for grain. The sale of milk and vegetables being my principal business, I turn my attention to the raising of those crops which produce the most and yield me the best return, such as grass, clover, green corn fodder for soiling, roots, carrots, sugar beet, mangold wurzel, and English turnips, having of the latter some fifteen varieties, sent me from the Patent Office by our representative. Should any of these last prove worthy of cultivation, the farming community shall have the benefit.

My principal grain is corn, of which I had four acres this season, on my oldest turf-land, manured with twenty-five two-horse loads per acre, ploughed nine inches deep, with plaster and ashes in the hill, then rolled and harrowed thoroughly, and marked off in rows three feet and three inches apart, each way. The corn was planted during the last week in May, and afterwards hoed twice, the ground through this process being kept perfectly level. One week from the last hoeing, I sowed the field with grass seed, harrowing it in each way, with a harrow made for the purpose. I find by experience, that I obtain larger crops of grass by seeding in this way, than I do by stocking down after the corn is ripe. I cut this season three tons and a half to the acre, seeded in this manner. The yield on this land the

present year, was three hundred bushels of shelled corn, very handsome and sound.

I employ two men, one by the year at $200, and the other seven months, at $16 per month. My sales of milk, vegetables, &c., amount to $3,000 per annum.

SPRINGFIELD, November, 1856.

Mr. Harvey Wolcott's farm was visited June 11th, by four directors, the president and secretary. It is beautifully located in the sandstone region of the Connecticut Valley. His mowing of seventy acres, viewed from a gentle elevation in his pasture, presented a fine appearance. No one need seek for a better located farm in New England. Mr. Wolcott has done much to improve his grounds. His sheep, the New Oxfordshire breed, and the only animals of the kind in the county, are very superior. His farm is large and will admit of much more labor being expended upon it than he accounts for, with his own in addition. A larger quantity of manure might be made. The directors were confident that a portion of his mowing would be much benefited by underdraining with tile. We award him a silver pitcher, appropriately inscribed.

Statement of Harvey Wolcott.

In the management of my farm, particularly that portion appropriated for mowing and corn land, it has been my practice to plough up about ten acres yearly, say nine inches deep, spreading evenly over the surface twenty-five loads of manure to the acre, mingling it with the soil to the depth of some four inches, and making the whole quite mellow. I then plant with a corn-planter, three and a half by three feet, dropping ashes or plaster with the corn, and performing the remaining labor mostly with a horse and cultivator. If my land inclines to be wet, I do not plough, but subsoil about seven inches deep the first time. I generally obtain from fifty to seventy-five bushels of shelled corn per acre.

If the land is wet, I stock down with the corn, the last time I run a cultivator through it, sowing one peck of Herds-grass seed upon each acre, which produces a crop that will yield well for five or six years, after which it will want top-dressing, or a

repetition of the same process of ploughing and stocking down. But if the ground is dry, and suitable for small grain, I stock down with wheat, rye or barley; but seldom with oats, preferring to turn in the stubble after the oats have been taken off, and then sowing about the middle of August. My money expenditure for hired labor, does not exceed $200 per annum.

I submit, herewith, a record of the products, for the current year, of the farm which I offer for premium, said farm containing about one hundred and fifty acres.

105	tons hay, from 70 acres, at $15 per ton, . .	$1,575 00
300	bushels corn, from 10 acres, $1 per bushel, .	300 00
200	" oats, from 10 acres, 50c. per bushel, .	100 00
48	" rye, from 4 acres, $1 per bushel, .	48 00
100	" buckwheat, from 5 acres, 50c. per bu.,	50 00
50	" potatoes, from 1 acre, 50c. per bush.,	25 00
Beef sold for cash, ...		200 00
Veal " "		40 00
Pork " "		15 00
Wool from 38 sheep, ...		40 00
40	lambs at $4 per head, ...	160 00
		$2,553 00

AGAWAM, October, 1856.

Dr. Lawson Long's farm was visited on the 6th of June, and again on the 14th of October. At each visit the directors were much pleased with his neat and systematic mode of cultivation. The grass upon the pastures, especially, appeared much more vigorous and flourishing than upon those immediately adjoining. This difference we believe to be owing mainly to the dressing of which he speaks in his statement.

We recommend an improvement, with reference to increasing the value and amount of manure. His cows are kept, day and night, upon the pasture,—and most farmers pursue a course no better,—or else allowed to remain at night in the barnyard, where the droppings are dried by the sun, and washed by the rains, until little of value remains. But let the cows, and such other stock as is brought near the barn, be stabled during the night, and some means devised by which the manure —both solid and liquid—may be preserved and composted, for

in this way, nearly as much value of manure may be obtained from the same amount of stock, in summer, as in winter. Should any think this assertion extravagant, we only say, try the experiment, as some others have done, and its correctness will be established.

Without further remarks, we submit the statement communicated to us by this competitor, and award him the second premium of $20.

Statement of Dr. Long.

"Both Labor and Capital should be invested upon the most economical principles."—WAYLAND.

The farm which I offer for premium, consists of thirty acres, divided as follows: six acres of tillage, nine of mowing, twelve of pasturage, and three of woodland.

First, Tillage Land.—At the first ploughing, in turning the sward, the Michigan plough was used, being sunk to the depth of eight and sometimes ten inches, according to the nature of the soil. Of this, three acres were planted to potatoes, one and a half to corn, three-fourths of an acre to oats, and three-fourths of an acre to cabbages.

1st, Potatoes.—They were planted in three lots—A containing one hundred and thirty rods, B two hundred rods, and C one hundred and fifty rods.

Lot A had been tilled three years. Three cords of compost manure were spread upon it, and immediately ploughed in. It was then furrowed, and manure and lime spread on the furrow, and the potatoes were cut and planted twelve inches apart, one piece in each hill. This lot appeared very promising up to the time of the drought, but the crop was nearly cut off by the dry season which followed. The yield was sixty-four bushels, while in former seasons, the yield on the same ground was one hundred and sixty bushels; variety, Early Carter.

Lot B.—Varieties, the Chenango and Scotch Fancy. This lot was subjected to the same treatment as the former, with the exception of placing lime only, in the hill. It was slightly effected by the drought, but the yield was one hundred and ninety-one bushels.

Lot C.—Variety, Jenny Lind. This lot was taken up this season, and was thoroughly ploughed, dragged and furrowed.

The furrows were three feet apart, and were strown with compost manure. The potatoes were cut into from two to four pieces, according to their size, and dropped twelve inches apart, being covered immediately, while the manure was fresh. They were cultivated at the first hoeing, and ploughed lightly at the second. The yield was two hundred and thirty-four bushels, on one hundred and fifty rods of land.

2d, Corn.—One acre and a half was assigned for this crop. The manure was ploughed in ten inches deep, with the fine plough, five cords of manure being used to the acre. The corn was planted with a corn-planter, which put the seed as much as four inches below the mean surface. Nine rows were planted with the hoe, with the same quantity of plaster in the hill as was used in the machine. At the first hoeing, a compost, consisting of guano, ashes, plaster and soil, was put around each hill and covered by the hoe. These nine rows took the lead, and kept it until the drought set in, when they fell back, and were nearly spoiled; while that part planted so deep by the machine, endured the drought better and produced the corn. The crop was estimated to have been injured about one-half, but the yield was sixty-five bushels.

3d, Oats.—Three-fourths of an acre planted, the plough No. 0, one-horse plough, drawn by two horses, was sunk to the depth of eight inches. It was dressed over by two cords of compost and eight bushels of oyster shell lime, and was stocked down to grass with a peck of Herds-grass and four pounds of clover seed. The yield of oats from this ground was estimated to be fifty-five bushels.

4th, Cabbages.—Three-fourths of an acre appropriated to this crop, and the ground was ploughed twice, ten inches deep, and dressed over with five cords of compost manure. The heads were large and compact, the variety being the Flat Dutch. I have sold one hundred dollars worth from the lot, and have two hundred heads left.

In regard to the potatoes, I would remark that those on lot B were planted by pushing them with the fingers, between the furrows, two and three inches deep, into the mellow earth, and I believe it was owing to this method of planting, that they endured the drought so much better than those in lot A.

Second, Mowing Land.—My mowing land, comprising nine

acres, was all treated to a light dressing of compost, and immediately after, to one bushel of plaster per acre. The yield of the first crop is estimated to be eighteen tons. One acre of clover and Herds-grass filled a scaffold thirty feet in length by twelve in width, to the height of ten feet, the hay being estimated to weigh four tons. In cutting over portions of my land for the second crop, I obtained two tons more, making in all, twenty tons. About the last of July, one hundred and fifty rods of the mowing land were ploughed for turnips, and manured with five cords of compost and eight bushels of oyster shell lime. The turnips were sowed on the first day of August, and at this writing, are not yet harvested. The estimated yield is four hundred bushels.

Third, Pasturage.—Twelve acres are set apart for my pasture ground, which is treated to seventy-five pounds of plaster once in two years; and two years since it was further enriched by ten cords of compost, consisting of muck, leaves, ashes and lime. The pasture furnishes ample support for five cows.

My dairy consists of four cows over five years old, and one three-year-old heifer. They have been furnished with the best quality of hay in winter, and with turnips while they lasted. The product of merchantable butter from this dairy, during seven months of the present year, was as follows:—

	lbs.	ozs.
April, 2 cows the whole, and 3 part of the month,	55	
May, 3 cows,	62	12
June, 4 cows the whole, and 5 part of the month,	110	
July, 5 cows,	110	
August, 5 cows,	90	14
September, 5 cows,	120	
October, 4 cows,	94	2
	642	12

The quantity of milk consumed in family use during the same period, was four hundred and thirty-eight quarts. As two of the cows will give milk all the coming winter, being farrow, and as two more, which yielded ten pounds of butter per week, each, during the last winter, will come in early, the total product from this dairy of five cows for the year, may be reasonably stated at not less than eleven hundred pounds. I

should remark here, that the temperature of our dairy-room is so regulated that we can make more pounds of butter from the same quantity of milk in winter, than in summer.

Manure.—I endeavor to manufacture all the manure necessary for the place, and have been nearly able to do so. I have recently built a barn, in the construction of which, I have paid special attention to this important feature of farm economy. The cellar extends under the whole building, answering the double purpose of a receptacle for manure and compost materials, and also of a pen for the swine, which manufacture the compost materials into rich manure in a short time. The soil used in composting is deposited in a stratum under the cow-stables, and is continually enriched by the drippings from above. When it is sufficiently saturated, another layer is spread above it, and becomes saturated in like manner. This process is used with several layers, and then the whole is shoveled out into another part of the cellar. It is shoveled over three times during the winter.

We will now compare the expenditures with the cash receipts, and those productions which are not to be used again in farm consumption.

Expenditures :—	
Labor and board of one man, . . .	$250 00
Labor of boy, ...	50 00
Manure, ...	17 50
Lime, ...	9 25
Plaster, ...	9 00
Guano, ...	5 00
Taxes, ...	21 88
Ploughing, ...	5 50
Miscellaneous expenses, ...	10 00
	$378 13
Receipts :—	
Cash for potatoes, ...	$150 87
320 bushels potatoes stored, . . .	160 00
Cash for cabbages, ...	100 00
Dairy, ...	275 00
Corn, 65 bushels, ...	54 25

Oats, 55 bushels,	$27 50
Pork sold,	44 00
Young pigs sold,	20 00
1 hog on hand,	36 00
1 sow on hand,	20 00
1 shoat on hand,	10 00
11 pigs on hand,	22 00
3 calves, cash,	3 00
1 calf six weeks old,	9 96
1 calf four months old,	20 00
600 quarts of milk,	24 00
Fruit and melons,	50 00
	$1,026 58
Deduct expenditures,	378 13
Net profit,	$648 45

Capital invested, $4,200. Interest received, 15⅓ per cent.

Holyoke, November, 1856.

Farms Entered for Three Years.

Col. S. Root's farm, of Westfield, was visited June 11th. He has moved his location since last year, much to his advantage in farming. His farm improvements consist in reclaiming a muck swamp, and the success attending his operations already commenced, show that great improvement can hereafter be made. The result of his cultivation has been the improvement of his land generally.

The alluvial bottoms of Westfield are rich in fatness, as their cattle abundantly show. Col. Root's land varies from the rich clay loam to sandy plains, and his plan for the improvement of the different fields has been such, that if judiciously carried out, will render them much more productive.

The farm of Mr. Rufus Leonard, of Agawam, was also visited June 11th. It is located on the green stone, or trap range of hills, that extend through the Connecticut Valley, from Mount Holyoke to West Rock, New Haven.

His attention is chiefly turned to reclaiming a piece of wet ground overflowed by a mill-pond, and to effectually drain this, the channel of a small stream must be lowered several feet.

The bed of this stream being solid trap rock, the hardest rock to excavate, the expense must be considerable. Besides this, an impenetrable growth of water-bush covers a large part of the lot; but there seemed to be no flinching on the part of the proprietor, notwithstanding the obstacles presented. The stupendous improvements must be carried through of a necessity, by "Yankee skill and Irish muscle." We hope he will be successful. Mr. Leonard has not presented a statement of his operations.

The farm of Horace M. Sessions, of South Wilbraham, entered for premium in this class, was visited in the month of June. On our arrival, we were made acquainted with the condition of the farm in previous years, and the improvements that have been making, and his plans of operation for the future. The farm contains one hundred and thirty acres, and is, to use the common term, a mountain farm. To some, it would appear to be a hard farm, and to others of a less enterprising spirit, it might seem a serious task to make very great or very profitable improvements; but with the enterprise and skill of the owner, we anticipate great, practicable improvements, especially if we may judge from what has been done and from the execution of his plans for future operations. We noticed extensive and lasting improvements upon his grounds, in opening ditches and laying underdrains, and in removing stone and building walls, thereby largely increasing the value of the land, and doubling the value of his crops. More of the same kind of work is now in progress, which we doubt not, at the end of three years, will exhibit improvements most desirable in the appearance of the farm as well as in the increase and value of its crops.

Among the farms entered is that of Phineas Stedman, of Chicopee. This farm is situated in the old town of Chicopee, on the road leading from Cabotville to Willimansett, two and a half miles from the former place, containing forty-seven acres. The first business, in reclaiming a piece of swamp land, was to open broad ditches to receive and conduct off the surplus water; then with a grub-hoe, to cut the bogs which are without number, removing and burning them, when suitably dry, the ashes of which being found quite valuable, and are sown with the grass seed. The rest of the work has been done with a team and plough, on that part which has already been reclaimed, and

then sown with buckwheat, previous to being stocked with grass seed. Upon that longest reclaimed, was mown, this year, a crop of hay at the rate of two tons per acre, giving good evidence that the outlay was not as profitless as would at first appear. The soil upon this lot is various, a portion being clay, and other portions a sand loam, while the lowest parts might properly be called alluvial, having received the wash from the hill and other lands for ages, presenting in its reclaimed state, the appearance of its being possessed of an inexhaustible fertility. Upon the hill, issues a small stream from a never failing spring, which affords an ample supply of water for a thorough irrigation of this portion, at a very small expense, and which the owner intends to bring into requisition, believing the soil to be some of the best on the lot.

One word upon manures, and we leave this subject, with appending a detailed statement from Mr. Stedman, giving more particularly his mode of proceeding. In this branch of husbandry, Mr. Stedman's course is worthy of emulation by all who would be successful in the art of farming, and that is, to make and save the greatest possible quantity of the most valuable manure; and this is done, in part, by stabling his cows every night, thereby saving all the liquid as well as solid manure which falls through into a cellar constantly stored with a fresh supply of absorbents, in the shape of muck, or soil, and other materials, one load of such manure being worth five times as much as one that has been exposed to the bleaching sun and drenching rains of a whole season. This matter seems to be wisely understood and duly appreciated on this farm, and its sequel is found in the production of its mammoth vegetables.

The farm of Mr. H. E. Moseley, of Springfield, was visited June 18th. The soil of his land is sandy loam, easy of cultivation, of more strength than the other sandy plains of that region, and shows the effect of constant cropping with cereals. Such lands are easily run out, and easily reclaimed. His attention is directed to rendering these fields more productive. We would recommend ploughing in clover, millet and other green crops.

Statement of H. M. Sessions.

The farm entered, is owned jointly by my father and myself, and contains one hundred and twenty-five acres, divided as follows: thirty acres of woodland, fifty-three pasturage, nineteen under cultivation the present year, twenty-three mowing, including five acres set for orchard ground. It is located in South Wilbraham, on the eastern slope of the mica-slate range of hills, that bound the Connecticut Valley on the east, ten miles from the river.

The soil of the western portion is composed largely of red sandstone and hornblende slate, mixed with mica-slate. Gneis predominates in the eastern part of the farms, from which large quantities can be quarried for building purposes. The central portion comprises a deep valley, through which a stream passes from north to south. A portion of this valley is tillage land, free from stone. About twenty acres are a stony, swampy pasture of but little value in its present state. This swamp we design to reclaim. One hundred and forty-seven rods of ditches were dug in the fall of 1855, and during the present year, one hundred and three rods have been dug, two feet wide and three feet deep, fifty rods of the same being nearly filled with small stones and covered with sods, for underdrains. Most of the remainder is designed to be deepened and filled in the same way. Three acres of land have been cleared of stone, twenty rods of rail fence and fifteen rods of wall have been laid, and stone enough drawn for twenty more. One and a half acres have been set with apple trees, two rods apart each way, and an old orchard filled up; making in all, seventy-five trees of grafted fruit of my own raising.

My inventory of stock on the first of November, was as follows: Twenty-three horned cattle, grade Devons, three full bloods, mostly young; two horses and four colts, two of which are Black Hawk Morgans; also, five swine.

The past season, I have raised two hundred bushels of corn from four acres, though injured by drought. An old pasture, not ploughed for twenty years, was broken up in May, one hundred loads of manure harrowed in, ashes and plaster dropped in the hills, and hoed twice. This fall, the land was sown with rye. Also, one hundred and fifty bushels of potatoes on two

acres, which rotted some where manured; six acres of oats, one hundred and eighty bushels; four acres of rye, badly winter killed, twenty-four bushels; one and a half acres of millet, in a reclaimed swamp, and fed off; and one and a quarter acres of turnips, one hundred and fifty bushels. An old pasture, full of rocks, never ploughed before, was ploughed twice, manured, and turnip seed sown, on the 10th of August. Four acres of land have been seeded down with rye, for pasture; and two acres with oats, for mowing. Four acres of oat, and one and a half of millet land, we designed to have seeded in August, but sickness and the repairing of buildings prevented. We much prefer seeding in August for mowing. The second crop of clover from two acres, was saved for seed; not yet cleaned. Our orchard products were one hundred bushels of market apples, seven barrels of cider, besides large quantities of apples fed to stock. One man eight months, with two others in haying time, constituted the hired help.

The ditching was let out, at twenty-five cents per rod. Two hundred and fifty loads of manure have been made; one hundred and fifty applied to planting and one hundred to mowing lands. The cattle are yarded at night, through the season; turf and litter of all kinds are carted in, and the yard cleared three times a year, in May, August and November. We are well satisfied that a much larger quantity of manure might be made from the amount of stock we keep, and that it would pay for the extra labor required in making it. We use plaster and ashes with much benefit. Our rocky side-hill pastures produce double the feed, by sowing plaster every other year. Other foreign minerals, and patent manures we prefer not to use, so long as animal manures are wasting on the farm for want of attention.

We submit the above disconnected statements for the consideration and disposal of the directors.

South Wilbraham, November, 1856.

Statement of Phineas Stedman.

My farm contains about fifty acres, lying in four separate lots.

No. 1 is the "Home Lot," and contains about sixteen acres,

extending from the main road to the Connecticut River. It is free from waste land, and like most land near the river, is suitable for grass or any kind of grain. About four acres of this has been in grass the last six years. I mow one crop, and usually plaster the latter part of the season. I apply a coat of compost manure once in two years, and cut about two tons of hay per acre. The remaining twelve acres I cultivate with various grain and root crops, and stock down with grass once in two or three years.

No. 2 contains six and one-half acres, and like the first, is suitable for any ordinary crops. It is about one-third of a mile from the buildings.

No. 3 is also one-third of a mile distant, and contains two acres. About one-fourth of this has ever been a waste, being mostly covered with water, and inhabited by frogs, bull-heads and muskrats. By draining, I have partially removed the water, and hope, by patience and perseverance, to accomplish its thorough reclamation.

No. 4 contains twenty-five acres, and is nearly one and a half miles from home. From six to eight acres of this, if not *worthless*, is very nearly *useless*, producing bog-grass, brakes and hard-hacks. This I hope also to reclaim by draining, bogging and filling. The work on one-half acre has been accomplished by filling to the top of the bogs, at an expense of $60 per acre, and I have no hesitation in pronouncing this half acre equal to my best mowing land. The remaining portion, I think, can be brought into use with much less expense. A portion of it has been bogged and ploughed, and is nearly ready for grass seed. About four acres of this lot had formerly been manured, and at that time, yielded two good crops of hay, yearly. The ground, generally, is better adapted to grass than grain, and is nearly all capable of being made good mowing land.

The stock of the farm consists of two horses, two bulls, nine cows, two yearling heifers, four calves and two swine. Five of the cows are thorough bred Durhams, and are kept for the two-fold purpose of furnishing milk, and breeding stock to raise. Three are grade Durhams, and, as I think, another has no Durham blood, I intend to dispose of her. I prefer pure Durham cows, for I find them quite as good for the dairy, and much

more valuable for breeding, whether the calves are sold or retained.

My crops the present year, I estimate as follows:—

From fourteen acres of mowing, one crop, twenty-three tons; seven acres of oats, three hundred and twenty bushels; three acres of corn, eighty bushels; one acre of potatoes, one hundred and ten bushels; one of ruta bagas, four hundred and fifteen bushels; one and a fourth of carrots, six hundred bushels; two of rye, thirty-five bushels; and one and a half of common turnips, almost a failure in consequence of the poor quality of the land. The same was the case with one-fourth of an acre of sugar beets. The balance is pasture land, except an apple orchard of eighty trees, set in the spring of 1851, which is beginning to bear. I consume most of the produce of the farm, the principal income being from the sale of milk and butter, stock and beef.

Chicopee, November, 1856.

Statement of H. E. Moseley.

The farm which I offer for the three years' premium contains one hundred and fifty acres, thirty-five of which are out-lands of a very light, sandy soil, producing very light crops whenever they are subjected to tillage. The other portion lies in one body, and is divided as follows: Ten acres are covered with a fine growth of young wood; fifty acres will be in pasture the coming season; eight or nine are stocked down to mowing; five or six are waste or swamp lands, and the remainder is sown with rye, while a few acres are reserved for oats. A portion of the waste land contains an inexhaustible amount of black, or peat muck, and is not by any means, the poorest part of the farm; the other portion, I contemplate converting into a cranberry patch.

My farm is located in the eastern part of ward eight, city of Springfield. The soil is principally a dark sandy loam, with a subsoil of sand, which is far from being retentive of manures. My attention is chiefly directed to the raising of grains, the most important of which, are rye and Indian corn. Of the former, I usually sow, on an average, sixteen acres, and plant of the latter about thirty. I consider roots a very important

article for feeding milch cows, during the winter. And the great secret of successful farming, is, the making and saving of the greatest quantity of valuable manure, a secret which I think most of our farmers, myself among the number, have heretofore been ignorant of, or have grossly neglected.

My farm presents an even, or rather a very flat surface, and consequently I am somewhat troubled with the surface water in spring and fall; but all this, by proper draining, can be conducted into a small stream which runs entirely across the farm, near the centre, at right angles with each portion. My buildings consist of a two story house, twenty-two by forty-seven feet, with an L; barn forty by fifty feet, with cow-shed attached; also a hog-house, corn-crib, and cart-shed twenty-four by thirty-six feet. By stabling my cows at night, during the summer, and throwing pond muck, or any other absorbent under them, each night, I find I am able to make as much manure, and of far more value, than I can make in winter. And now for the figures. The farm is found upon the assessors' books, valued at about $4,000.

The interest of which, is		$240 00
Invoice of stock:—		
At present I have two oxen, worth .	$150 00	
2 horses, ...	100 00	
2 cows, three years old, . . .	70 00	
4 steers, one and two years old, . .	100 00	
4 old hogs and 4 pigs, ...	70 00	
Interest on same, ...		29 40
Amount paid for labor, ...		126 00
My own labor, ...		150 00
My wife's labor with a girl's help a portion of the time,		105 00
Blacksmith's bill and other items, . . .		25 00
Hay seed and plaster, ...		16 00
Guano, ...		9 62
Taxes, ...		37 67
Expense of keeping stock, ...		348 49
Rearing and fattening swine, sour milk and kitchen waste excepted, ...		65 00
Estimated expense of supporting family of six persons, ...		350 00
Total expense, with interest on farm and stock,		$1,502 18

The produce of the farm is as follows:—

300	bushels Indian corn,	$300 00
200	" rye,	200 00
125	" oats,	62 50
200	" potatoes,	100 00
16	" onions,	12 00
76	" carrots,	28 50
4	" beans,	10 00
50	" turnips,	12 50
6	tons hay,	90 00
6	tons rye straw,	50 00
2	tons oat straw,	16 00
15	acres corn fodder,	50 00
Beef sold,		90 00
Pigs sold,		40 00
Tobacco,		300 00
Butter, 225 pounds,		56 25
Five cart loads of pumpkins,		10 00
One hundred heads of cabbage,		4 00
Pork,		100 00
One hundred and fifty loads of manure,		150 00
Growth of stock,		75 00
Pasturing,		44 00
Labor done off the farm,		250 00
Tobacco plants,		16 00
	Total,	$2,066 75
	Deduct expenses,	1,502 18
	Net profit,	$564 57

SPRINGFIELD, November, 1856.

NORFOLK.

Report of the Visiting Committee.

The committee appointed to visit as many of the towns in the county as practicable, and report their observations for the benefit of the society, submit the following:—

In almost every town in the county there are a few farmers,

who are men of wealth and taste. Their large farms are well tilled, well managed, and supplied with the finest stock. They make valuable experiments in agricultural operations, introducing new methods, new implements, new seeds, new manures, new breeds of cattle. If their experiments fail, they easily sustain the loss; if they succeed, the community shares in the benefit. These men give a higher character to the business, and a large portion of the improvements in farming, within the last few years, is due to their enterprise and public spirit. One of these farms, that has never been mentioned in the Society's transactions, and is well worthy of honorable notice, is that of Mr. H. H. Hunnewell, in West Needham. It includes two hundred acres, and is beautifully situated on both sides of Wabun Lake, in one of the most delightful portions of the county. A vast amount of money has been expended, with consummate taste and skill, upon the ornamental part of the estate. The walls and hedges are substantial and handsome; many varieties of native and foreign trees and shrubs have been planted; hot and cold houses contain grapes and flowers; the buildings are models of neatness and convenience; stock of the best breed is kept; and ditches and meadows supply to the barnyard great quantities of mud; artificial manures are freely used; the mowing machine has been employed on the place for three years, to the entire satisfaction of the proprietor; wood is sawed, corn ground, and water supplied to the house, stables and garden by a steam-engine; the land appropriated for farming purposes appears to be thoroughly cultivated and to yield large crops; productive mowing grounds have been made out of worthless meadows; and in every department are evidences of good judgment and practical skill. Orchards of apple and pear trees have been planted with excellent success. Within six years, thousands of trees of various kinds have been successfully transplanted; many acres of barren land brought into cultivation, and a pitch-pine plain has been converted into an elegant farm. These results testify to the owner's enterprise, and to his intelligent interest in the pursuits of rural life. We must, also, add, that his readiness to exhibit both the methods and the results of his operations, and to encourage, by the most liberal display, the exhibitions of this society, together with his courtesy and hospitality, render a visit to this farm as agreeable as it

is instructive. There is scarcely any way in which a man of wealth and refinement can be more useful to the community, than by "blending a liberal display of elegance and taste with a skilful and profitable husbandry." The introduction of new fruits, new seeds, new trees and improved methods of cultivation, is a boon not likely to be over-estimated.

Another more numerous class of farmers consists of those, who, in addition to ordinary farming pursuits, derive from the sale of wood the means of cultivating their land. Or they have a cranberry-meadow, or some other special object of interest and profit, from which they gain a living, independently of the farm. In some cases, the farm is neglected on account of this extra source of income.

Another class, quite common in this county, consists of men partly farmers and partly mechanics. They cultivate a few acres, and pursue some other calling during a part of the year. We have often observed that the lands of these men are extremely well tilled, their gardens and orchards in fine order,—examples of neatness, and producing large returns.

A fourth class, not farmers, but deriving their support from labor applied to land, is that of the gardeners and fruit-growers, a large and important body of men. No workers on the soil bring their capital and labor to so good a market as these. They are limited in territory, obliged to do their work thoroughly, cultivate their land up to the extent of its capability, grow several crops in succession, and realize from a few acres a larger income than most farmers from ten times as many. Many parts of the county are favorably situated with reference to this business, nor is there the least danger that it can be overdone. Boston, and large manufacturing and mechanic villages, furnish unfailing markets for produce. The price is always high, and the supply below the demand. The wonder is, that more enterprising young men do not engage in this business.

Next come the farmers proper, who constitute the majority of all that live upon the soil. These are the most deeply interested in agricultural experiments and in the success of agricultural societies. Others have various sources of income, but the farmer must look to his land and labor. Whatever tends to make his land more productive, or to diminish his labor, or to apply it more judiciously, should arrest his attention, and gain at least

a patient hearing. The creating of food is a business that can never wear out, and must always furnish employment to the great mass of mankind. Whatever renders that employment easier or more attractive or more remunerative, deserves the consideration of those engaged in it; for every thing having these results will tend also to elevate and improve the character of the farmer. Small farms, cultivated by the owners, should be objects of special interest; for they are the surest means of developing the resources of the country and of raising up hardy and industrious men, the true conservative element of society.

Although in every quarter we found but one opinion, namely, that there is an increasing interest in agriculture, the proofs of which were improved methods of tillage and larger crops, yet from hundreds of farmers our society and its objects receive little favor or sympathy. Very few, considering the whole number, attend its annual fairs, or send in contributions of their produce or stock,—partly, perhaps, because they have not made themselves familiar with its design, which is simply to improve the agriculture of the county, by exciting competition, by disseminating knowledge, by preserving and recording facts, and by bringing the experience of all to bear upon the operations of each,—partly because they are isolated from each other, and have few occasions of mutual conference, to compare notes, and to learn from their common successes and failures. This is a cogent reason why they should belong to the society and attend its meetings. A man who lives by himself, and walks his beaten round, and repeats again and again the same routine, is apt to become unreasonably satisfied with himself and his course. And however intelligent a man may be, it is not to be supposed that he cannot learn from the results of others' activity. It is believed by this committee that actual contact with our society, and participation in its objects and labors, would promote the interest of every individual farmer. Its encouragements and rewards are distributed with impartiality, and its sole aim is to repay with large increase the time or money that each person contributes.

Hitherto our fairs have been supplied with valuable and beautiful articles from the field, the stall and the workshop, but chiefly contributed by a few towns. Now in every town we have found good farmers, who might add to the pleasure and the profit of

the occasion, by bringing something of their own growth or raising, or by detailed statements of particular crops. A great amount of useful knowledge respecting the best methods of conducting various processes in draining, seeding, manuring, reclaiming meadows and other details, is lost to the community by the backwardness or indifference of those who conduct these operations.

In several towns in this county, agriculture is but little attended to. In these towns the people are mostly devoted to mechanical pursuits. Much land that was formerly ploughed is now grown over with young wood, probably the most profitable use that could be made of it. It is a common remark, that there is more woodland and less wood than there was twenty years ago. The railroads, manufacturing and mechanic villages have rapidly increased the value of wood, which has risen from three to six dollars a cord. This rise has induced some sowing of wood seed and setting out of young forest trees. We would refer the reader, for further information and examples, to the report of the committee on forest trees, contained in this volume, the author of that report being a member of the visiting committee.

These and several other instances on a smaller scale, show that the growth of wood may be made profitable on poor land.

No part of this county, is, exclusively, agricultural. There are not more than one or two towns in which the produce of agricultural labor equals in value the products of manufactures. In most towns the latter exceed the former from three to ten or twelve times in value; and where the difference is greatest, the progress of agriculture is slowest. We may take a single article as an illustration. In the southern and south-eastern towns there is very little corn fodder raised, an article which the farmers in the northern and western towns consider indispensable to success, the introduction of which is justly considered among our most decided improvements. In a wet season, like the past, there was less necessity for corn fodder than usual. But in our average summers, with their intense drought and scorching heat, our old pastures, good for little at best, are almost worthless. Examples are not wanting, of great success in renovating old pastures. We will mention one that came to our notice this season:—

A well known farmer, in Stoughton, had a worn-out, mossy pasture, which he broke up and manured two years ago, and from four acres of which he has, this summer, cut eleven tons of good hay. Another farmer, noted for the amount and excellence of his butter, has, within seven or eight years, broken up, manured and cultivated more than twenty acres of good-for-nothing pasture, and laid it down again in so productive a condition, that he maintains, in excellent order, more than double the amount of stock that was ever before kept on that farm.

There is a growing conviction among farmers, that they must either expend money in improving pastures, or abandon them, or supply their deficiencies by an increased amount of green fodder. There can be little doubt of the indispensableness of the latter course, if the object is to produce milk; for nothing excels, in milk production, the tender, succulent leaves and stalks of young corn and recently-grown grass.

We have now in mind a farmer, in this county, who keeps seven or eight cows in the stable through the summer, and feeds them on green fodder, chiefly corn. We asked him the reasons for it. His answer was: 1. That he gets more milk than he can by any other method. 2. That he gets more manure, especially liquid manure. 3. That he saves it all by keeping a supply of mould or mud under the stable, to be taken out and renewed as often as necessary. 4. That it is less troublesome than to drive his cows to pasture; that they are less vexed by flies and have equally good health. 5. That his mowing land is every year growing more productive without the expense of artificial manure.* He estimates that on an acre of good land, twenty tons of green fodder may be raised. That which is dried is cut fine and mixed with meal or shorts, and fed with

* An English farmer says: "Where milch cows are allowed to range abroad for their food, they will never produce that quantity of milk that they will when confined, let their food be ever so plenty; when they are not hungry, they will be searching after the sweetest spots of herbage, and thereby deprive themselves of rest. There is economy, also, in land. Thirty acres of land would be sufficient to produce food enough for forty dairy cows,—if properly managed,—including for hay; whereas, in the common mode of feeding, twice that number of acres would not do, and they would not produce above half the quantity of milk and butter."

profit. He believes that a reduced and partially worn out farm —supposing the land to be naturally good—could be brought into prime order in five years, without extra outlay of money for manure, by the use of green fodder in connection with the raising and keeping of pigs;* not fattening them, but selling at the age of four or five months. His own success certainly offers great encouragement. He traces it chiefly to making a large quantity of manure; large, that is, in proportion to the size of his farm, which is small. Most of his cultivated land is in grass. He keeps it down from eight to ten years, practising top-grassing.

Now we naturally entertain great respect for a man who makes money by his business, and improves his farm at the same time. However theoretically wrong his opinion may appear, it is justified by the results of the practice that grows directly out of it. When by following out his idea, he increases the value of his land and puts money into his pocket for a series of years, we must believe in such infallible logic.

There is not a town in the county that does not show an increased growth of carrots, or ruta bagas, as supplementary articles of food for cattle. They are, perhaps, more desirable than common, in consequence of the damage done to the quality of the grass by the heavy rains, especially in the meadows, where much was lost and all injured. May it not be questioned, whether hay is not generally more impaired in value by standing too long, than when cut early? Be this as it may, roots form a valuable addition to the food of cattle, both as nutriment and as an alterative in promoting health. No one article of dry food contains the variety of nutritive principles required by the constitutions of cattle. For working horses, hay distends the stomach too much, and makes

* Mr. D. finds that one breeding sow will turn over and thoroughly mix with the droppings of cattle, one ox-cart load of mud or loam per week, making the best of top-dressing for grass. This is his practice, and he manufactures in this way, great quantities of manure to keep his mowing lands in the most productive state. When we consider that the first want upon a farm is that of manure, and that very few farmers supply as much they might—when we remember what a waste there often is of privy manure, of the drainings of the sink, of the leaves and stalks of plants, we should be stimulated by every such example as the one before us, to study the strictest economy in the production and application of manure.

labor and travelling difficult, to say nothing of the fact, that much hay is musty or mixed with weeds. The exclusive use of hay-food induces constipation. A judicious mixture of carrots with hay, is probably the very best fodder for working horses. Their value for milch cows, was well understood long since. Our acquaintance with the farming of the county has not brought to our knowledge any other way in which so large an amount of food can be raised upon the same quantity of land, and with so little labor. The idea is familiar enough in England, where land is dear and economy of space to be considered. Indeed, it was said long ago, that "the foundation of good agriculture was the raising of roots, as winter food for cattle." As land becomes more valuable here, the more clearly will it be seen that the crop which yields from thirty to forty tons of nutritious food per acre, must take precedence of others, especially in a community where there is a growing demand for horse fodder, and where new butter and milk bring the highest prices. The cultivation required is attended with a large outlay, but that is of no importance, provided the income is in a far greater ratio. The crop pays for all, to say nothing of the pleasure of seeing such great and decided improvements. "Half the diseases from which cattle suffer, proceed from obstructions occasioned by dry food."

Several of our acquaintances have failed to raise large crops of carrots, from forgetfulness of the necessity of deep ploughing and high manuring. Carrots require both, and will handsomely repay all the manure and cultivation they receive.* The land should be ploughed three times to bring it into fine tilth, and not harrowed, but simply brushed smooth, that it may be light. The largest and proportionately cheapest crop that we have seen, was manured with guano at the rate of over

* An account of one of the largest growths of carrots in this county may be found in Transactions of the Massachusetts Agricultural Society, vol. 1, p. 83. The crop amounted to one hundred and sixty bushels, on one-eighth of an acre, or at the rate of more than thirty tons per acre. The only peculiarity we can discover in the proceeding was, that the manure, three ox-cart loads, was ploughed in, in November. As soon as the frost was out, the land was ploughed again, and a third time in May. The most thorough culture is generally rewarded with the most remunerating crop. The tendency of men to attend to their own or their fathers' ways makes it hard for this truth to be believed.

a ton and a half to the acre. In a poor and poorly tilled soil, the roots will not only be small, but irregularly shaped. The white Belgian variety grows very large, and is much esteemed.

To avoid weeds, some farmers plant carrots on land that has been kept clean, with one or two crops of corn. Others plough an old pasture very deep, with a Michigan plough, use fine manure and harrow lightly.

It is impossible for us to say how much guano has been used this year, only that large quantities have been employed in some towns, scarcely any in others, and that its use is rapidly increasing. Men begin with a bag or a few hundred pounds, experimenting cautiously, feeling their way along, and usually with decided success and encouragement.* One neighbor after another hears of the experiment, and imitates it. One farmer mixed a ton of guano with fifty loads of meadow mud, put it

* We have received the following note from Mr. Charles Breck, of Milton, one of our most accurate and intelligent experimenters :—

"I have been conducting a small experiment with guano as a top-dressing for worn out grass land, for the last three years, with very good success. In 1840, a crop of rye was taken off the land, after which, the stubble was ploughed in, and grass seed sown ; the scattering rye came up, and grew well, and, could it have been easily separated, would have yielded a good half crop. It was mowed with the grass early, and used for fodder, since which time, the field has been constantly mowed and fed, without any top-dressing. From this you may conclude that the land was as nearly run out as it could be, although it is naturally a mellow, productive soil.

"In the spring of 1854, I staked off two square rods, which, to appearance, were as nearly equal as they could be, and lying side by side. On one rod I put twelve cents worth of guano mixed with one and a half peck of sand from the road side. On the other rod, nothing was put. In July, the grass was mowed, well dried, and carefully weighed. On the rod which had no manure, there were six pounds of hay. On the rod on which the guano was used, were twenty-six pounds of hay.

"In 1855, on the first rod were only three pounds of hay, and on the rod with guano, there were nine pounds. In 1856, I mowed and dried the grass carefully. On the first rod I had three pounds of hay, and on the second nine pounds, making, in three years, a gain of thirty-two pounds, equal to 5,120 pounds to an acre, by the use of guano, that would have cost nineteen dollars and twenty cents, with a fair prospect of its continuing some time longer, besides improving the quality of the hay very much.

"In answer to your inquiries about plaster, I would observe, that I have never seen any good effects from its use as a manure, although I have seen it tried many ways."

in the hill, and got a large crop of corn, but a larger one of stalks. Another informs us that he mixed in the same way, spread and ploughed in, and his crop came forward a little slower than the other, but was about equally good.

Another broke up four acres of pasture overgrown with moss and huckleberry bushes, used six hundred pounds of Peruvian and twelve hundred weight of Mexican guano, laid the land down to grass without grain, and at the first mowing had at least one ton of good hay to the acre.

Another spread six hundred pounds of Peruvian guano on two acres of exhausted mowing land, and cut between two and three tons. Several repeated this experiment with similar results. In one case, the farmer, with less than his usual good judgment, scattered the guano unmixed, and without crushing the lumps. There was a good deal of waste and loss, but still he was more than paid for the cost of the guano, by the increased crop of grass. It is commonly thought advisable to mix guano with rich mould or mud, several weeks before using, and to shovel it over three or four times, keeping it well covered.

Another farmer laid down his land with winter rye, used three hundred pounds of guano to the acre, and had a very large crop. Others lay down their land with grass, and for four years get from a ton to a ton and a half of good hay per acre, without further dressing. A case of this kind was reported in our Transactions two years ago. The writer of that report laid down three acres to grass last fall, using three hundred pounds of guano per acre, with the very best success. For six years he has used it with corn, grass and garden vegetables, and always, as he believes, profitably, although there are but few men in the county who have so large a quantity of barnyard manure.

During the past summer, T. Clarke, Esq., of Walpole, reclaimed two acres of wet meadow. One acre was manured with three hundred pounds of guano, the other with five cords of the best stable and barnyard manure. The grass seed has come up equally well in both. There is no perceptible difference in the appearance. But the manure in one case, cost about ten dollars, in the other, about twenty-five dollars.

Similar instances, too numerous to be detailed, seem to show that guano is available in many different soils, and for various

crops; that if its effects are less permanent than those of other manures, their duration may be proportioned to the expense, while the comparatively small amount of labor required for its application, furnishes an argument in its favor easily appreciated by those who pay the present wages of farm help.

In those places where the least attention is paid to agriculture, of course the least interest is felt in this or any other manure. But where guano is most used it is most highly prized. In one town, a few years ago, two public spirited individuals introduced a large amount of guano, which was used with satisfactory results, but within a year or two, several experiments have been made with super-phosphate of lime, in that place, with results still more satisfactory to the parties interested.

In one town, almost wholly devoted to mechanical pursuits, we could not hear of any person who had used guano. We found, however, an excellent farmer, whose only reason for not using it, was a very good one, namely, that he had a plenty of barnyard manure.

Not a few are puzzled to understand how three or four hundred pounds of guano can maintain land in as good order as the four or five cords of stable manure which they have been in the habit of using. It is of comparatively little consequence whether the fertilizing properties of manure are distributed through a large or small quantity of matter, provided they are distributed uniformly. If the essential elements of six cords of stable manure could be compressed into one cord, and evenly distributed and buried in the field, the advantages of the manure would be secured at less expense. The mud, straw, hay, leaves, roots, cornstalks and weeds that compose the bulk of the manure, are comparatively inert as fertilizers, and in the most favorable view, require a long season of fermentation to develop their qualities. They are receptacles of ammonia and other fertilizing agents contained in the solid and liquid animal excrements. Hence, if guano contains these fertilizing properties in a concentrated form, and if it can be furnished and applied cheaper than an equivalent amount of barnyard manure, it will be used in preference.

The barnyard manure contains all the properties that the crops require. The farmer is satisfied with its operation, and wants nothing better. But he cannot, in ordinary cases, make

enough of it to answer his purpose. It is a costly article to manufacture, and, at the present prices of labor, it can be carried out and applied to the land only at great expense. Hence, he uses guano, not as a substitute for barnyard manure, but as an auxiliary. The time may come, under judicious management, when the land shall yield such crops as will, in their consumption and in the consequent production of manure, render guano unnecessary.

Of course all experiments will not be successful. Guano is a new and powerful fertilizer. People, forgetting or not knowing its strength, employ it too lavishly and kill their seed, or scatter it in dry weather, its ammonia evaporates, or covering it too lightly or not at all, and the same result follows, or neglecting to mix it thoroughly with mould or mud before using it, thus losing part of its virtue. There is no remedy for this but increased knowledge and experience. In England, where it has been most used, it is prized more highly each succeeding year. There, and in some of our middle and southern States, where it is extensively employed in restoring worn out land, it is found to be a cheap, profitable and lasting manure. There is not a subject connected with farming, about which so many inquiries are made of this committee, as about guano.*

We are obliged to report a general failure in the potato crop. Many ingenious theories have been proposed, to account for the rot, but no preventive has yet been found. Perhaps none will be found short of an entire renewal of the stock from seed grown in the original home of the potato. Potatoes that grow wild in Chili, where the disease is not known, may revive the reproductive energies of the plant now greatly impaired by over cultivation and strong manure. New varieties from seed raised here, may

* From a series of very carefully made experiments by Mr. William Fleming, of Barochan, Scotland, he came to these conclusions:—"Particular attention should be paid when guano is used, that it be well mixed with the soil, as this is of the greatest importance to the health of the plants and the bulk of the crop, especially in the case of potatoes and turnips. It has also been found, after many trials, that the best and most economical way of using guano for the potato crop, is, by adding two or three hundred pounds per acre to half the usual quantity of farm-yard dung, which will be found to give, at least, as good a crop as double the quantity of dung alone, whilst it is much cheaper in the first cost, and saves much cartage. For hay crops, the most profitable way of using salt, ammonia, nitrate of soda and guano, is to make a compost."

do well a few years in some instances, though not always, and then submit to the general fate. We have had seedlings which rotted worse than almost any. The early dug crops fared the best, but the intense heat and heavy rains developed the disease of the others to a lamentable extent. And in fields where the rot was not excessive, the crop is small; probably the average is much under a hundred bushels per acre.

This fact shows as great falling off in the yield as in the quality. By reference to the proceedings of the Agricultural Society of Massachusetts, from thirty to forty years ago, it appears that premium crops ranged from four hundred to six hundred and fifty bushels per acre, while the average was about two hundred. There has been a gradual tendency to degeneration in the principal varieties for several years, that has discouraged farmers and led them to apply their means to more productive crops. The uncertainty of the yield deters them from making a large outlay, while the consequent high price of good potatoes prevents them from being used as food for stock.

Within two or three years, the farmers in this county have gone more largely than ever before into raising of horses and cattle. In almost every town we find breeding mares and colts, and calves from stock of the finest quality. High prices have given a new impulse to this business, which promises to be profitable on one condition, namely, that only the best breeds are raised. By this we do not mean that the full-blooded foreign breeds should be perpetuated exclusively, but that by their aid, with the best specimens of our native cattle, a breed may be formed that shall be expressly adapted to our climate, soil and feed.

The farmers hardly did themselves justice at our last fair. Although there were many excellent cows and bulls present, yet the exhibition fell far below what the county might, and ought to do. We hope they will do better another year.

In more than half of the towns in the county, there is not a mowing machine, and there is a common prejudice against its introduction, a fact by no means creditable to the intelligence and enterprise of our people. In this respect, however, it meets the usual fate of improvements. The same man who determined not to use the roller, and horse-rake, and corn-sheller, and afterwards used them, now condemns before hand the mowing ma-

chine. It was said, that it could not be used in our fields; that it would be too heavy, and always out of order; that it would ruin the horses, which, in their turn, would ruin the grass by trampling it down. A great amount of cheap wisdom was employed to prove that it could not be used; and when it was successfully used, then the objection was, that the expense was ruinous, that small farmers would be excluded from its benefits. This objection is now removed, as we shall presently show by this year's experience. The mower has triumphantly established itself, and may be regarded as a fixed fact until something better shall displace it. No doubt it will be improved, will be cheaper, lighter, and capable of doing more work at less expense. That it will do it better, seems hardly possible. Enough has been done to show, that the principle of its construction is sound, and that, with more or less modification, it may be profitably employed on small farms. Several instances of its successful operation have fallen under our observation, but, inasmuch as the committee of the State Society are preparing a detailed report upon this subject, we forbear to mention them. A single case may be given as an example.

Mr. W. Salisbury, of Medfield, informed us that Mr. Joel Morse, with one of Allen's machines, mowed for him twelve acres of grass in a day. The grass made twelve tons of hay. Mr. Salisbury said that he was perfectly satisfied with the manner in which the work was done. The grass was cut more uniformly smooth than the best mower could have done it with a scythe.

We have heard many farmers express a determination to use the machine next hay-time. As full statements of the comparative excellence of the different machines may be expected in the report already alluded to, we do not consider it expedient to be more particular in this notice.

The late Hon. John Lowell relates an experiment which he made with plaster, with very satisfactory results. "I had a field which had been laid down to grass more than seven years, and was very much sward-bound. I began on the worst part of the ground, and the person employed to sow it with plaster, instead of three bushels on an acre, as I directed, put the three bushels on a fourth of an acre. The effect was so surprising, that when the trustees of the society were at my house, I asked

them separately to say where the plaster began and where it ended, and no one failed to point out the precise limits. The crop was double that of the rest of the same piece of ground, quadruple that of the preceding year.

"It is now rendered certain, by the experience of many, that the neighborhood of the salt water forms no obstacle to its use." —*Agricultural Reports for* 1816, vol. 4, p. 272.

In the generations before ours, the leading farmers of this country used plaster largely, and with satisfactory results. But lately little attention has been paid to it, and it is difficult to find men whose testimony is decisively in its favor. It is possible that it deserves the praises which our predecessors bestowed upon it, and that it has been supplanted by guano and other new manures. If it is thought worth while to continue its use, two things should be kept in mind: first, that it will answer better on dry, light or gravelly loams than on other soils; secondly, that its effects must be waited for patiently, because it is not soluble in less than five hundred times its weight of water. Hence, if applied to grass land or pastures, it should be spread in the fall or winter, that the melting snow and early rains may dissolve it, and thus bring it in contact with the roots.

On no other manure, not even guano, is there such a variety of opinions concerning its operation. Nothing but numerous and long continued experiments can determine the vexed questions of its value and of the manner in which it produces its results.

Farmers continue to use plaster, both in hills and as top-dressing; yet there are few substances employed as manure that are less satisfactory. We have asked many farmers whether they knew *any* results to follow from its use. Most of them replied, none, either good or bad. Some thought it might have fixed the ammonia in the manure or the atmosphere. Others had reclaimed old pastures by a liberal use of plaster. In the State of New York, a farmer believes that he saved his potatoes from rot in 1846–7–8, by two or three liberal dressings of plaster and ashes. No such result has occurred, to our knowledge, in this vicinity. In parts of England it is the practice of farmers to apply one hundred and fifty to two hundred weight of plaster per acre to their grass lands every year. On dry, open land, in a wet season, or on other land, at a greater distance from the sea-shore than our county reaches, it may be found advanta-

geous. It is sometimes thought to increase the activity of barn-yard manure, by being mixed with it when turned over.

The curious reader will find in the second volume of the Massachusetts Agricultural Repository for the year 1805, an Essay upon the Nature and Uses of Plaster, in which it is highly extolled. The writer says: "It seems to comprise in itself more virtues as a manure, than almost any other manure of equal bulk, or even of equal weight, which is known in common practice. It will restore to good heart the old farms to which it is suited, with little expense and in a short time. It begins by turning into manure various useless substances found upon the ground, and thus prepares the way for an increase of stock. The grass obtained through plaster is peculiarly acceptable to cattle, which always single it out from other grass. It is, indeed, distinguishable to the eye and touch, and the hay from it, is, perhaps, alike, valuable. Plaster, likewise, appears to have a direct power in stimulating the sprouting of seeds and the growth of plants."

After a great deal more laudatory than this and more indefinite, the author adds, "It is commonly supposed to be useless near the sea."

It is gratifying to notice, in every part of the county, the increased attention given to reclaiming of meadows. The instances are too numerous to be specified, in which wet, boggy, bushy meadows, that yielded nothing whatever of value to man or beast, have been converted into excellent mowing fields, by draining, by gravel and manure. Farmers have found such meadows to be the best land they owned; that is, yielding the largest returns in proportion to the money expended upon them. Instead of poor hay, nearly worthless, and which animals will eat only to keep from starving, the reclaimed meadow furnishes from two to three tons per acre of the best hay, and hay brings milk, butter and meat. Meadows so treated require but little labor or expense for several years.

The high price and increasing demand for cranberries have given a new impulse to their cultivation. We refer both to the improvement of natural meadows, by removing whatever hinders the growth of the vines, and by a systematic course of flooding, and to the planting of vines in meadows, expressly prepared for that purpose. Some experiments on a large scale have been

commenced, but sufficient time has not yet elapsed to warrant an expression of opinion upon the results. Suffice it to say, those most interested are satisfied that they shall reap a good harvest. We have had frequent inquiries about the methods adopted, the kinds of vines, the time of setting out, the preparation of the land, &c., by parties bent on experimenting on a small scale. But our own stock of practical knowledge is small, and we can only refer inquirers to men already engaged in the business, or to various contributions in previous volumes of our transactions. In the volume entitled, "Agriculture of Massachusetts, by C. L. Flint," for 1853, will be found several excellent communications, which go into the details of growing cranberries. Also a report upon cranberries by the Secretary himself, which is full and complete, abounding in practical suggestions. Very few persons are aware of the extent of the cranberry culture, the demand for the fruit, or the interest recently awakened in the details of various methods. On these and various other topics, Mr. Flint's report affords much instruction. The market is never glutted with this article. There is no probability that it can be. The price is always high, and the demand steadily increasing. We believe, that in a few years, many a now unproductive meadow will be worth more than all the rest of the farm. This is already the case in several instances that have come to our knowledge. We know men who have received from one hundred to five hundred dollars for their cranberries this season; and the natural meadow of Captain W. Tucker, of Canton, does not probably yield a net annual profit of less than two thousand dollars. Perhaps no man in this vicinity has had more experience in this business, or is better qualified to give the necessary information to persons about commencing it.

Our principal cereal crop, Indian corn, has been remarkably large and sound this season. We have found a most gratifying disposition, on the part of farmers, to increase the average yield, and to prove that the largest crops are proportionably the cheapest,—that fifty bushels per acre cost less per bushel than thirty. Many farmers listen with incredulity to the statement that a hundred bushels can be raised on an acre; but it has been done before, and it has been done this year, at least, in one instance. We refer to the crop of the Messrs. Sias, of Milton, an account

of which will doubtless be furnished by the committee on grains.

From an experiment made in Dorchester two years ago, it was found that a mixed crop of corn and some lesser vegetable, as cabbage, which does not shade the land, and which lets in light and air, was more profitable than corn alone. Our farmers sometimes substantially adopt this method, when they alternate four or five rows of corn with as many of potatoes. May we not suggest that the experiment should be repeated by many individuals? From a comparison of results, it might be seen whether the plan of mixed crops ought to be gradually adopted.

As a matter of literary curiosity, we quote a few lines from one of the earliest European navigators who ever saw Indian corn. They will show, that we follow the Indian method of cultivation to a great extent,—that we do, in fact, merely perpetuate fashions set by the first cultivators. In 1607, the Sieur de Champlain, captain in the French navy, touched at the mouth of the Kennebec River. In his journal he says: "Here we saw Indian corn, which they sow, three or four grains in a place, covering them with earth. At a distance of three feet they plant as much more, and so on. In each hill of corn they plant three or four beans of various colors. They plant their corn in May and gather it in September." At the Saco River, "the savages told us that all who inhabited this region cultivated and sowed the land like those we had seen." At Cape Cod, July 21st, "we landed and passed through a field of corn, planted like those we had seen before. The corn was in blossom and about five and a half feet high. There was also other less advanced, having been planted later. There were also several fields not cultivated, being left to recruit in fallow." After having passed round Cape Cod, they "found much land well tilled in corn and other grains. All the people of this place are industrious, and make provision of Indian corn for the winter, which they preserve in the following fashion. On the declivity of the hills they make trenches in the sand, five or six feet deep, more or less, and having put the corn into sacks made of grass, they deposit it in these trenches, and cover with sand three or four feet deep. The grain is as well kept as in our granaries." "Arrived again at Saco, September 21st, and found that the Indians had gathered their corn." From these

extracts it will be seen that we only pursue the methods which the aborigines invented, at a time when their civilization had reached a higher point than is usually assigned to them.

We take this opportunity to return our thanks to numerous individuals, who have forwarded our objects by their readiness in furnishing the desired information. Wherever we have been we have met with a welcome reception and generous hospitality. We have formed a higher opinion of agriculture from our more intimate acquaintance with those engaged in it. Foremost in importance among industrial pursuits, it will be foremost in its pecuniary returns, when the same accurate knowledge and careful oversight are applied to it, which are found indispensable in manufactures and commerce.

JOHN M. MERRICK, *Chairman.*

Report of the Committee on Farms.

The committee on farms are happy to have it in their power to state that they have not been permitted, during the past year, to be idle or unoccupied in their official capacity. They have been invited to visit two farms. They complied with the requests that were made. Accordingly on July the 8th, the committee, at the request of the Hon. S. D. Bradford, of West Roxbury, visited his farm. They had the pleasure of meeting, on that occasion, the president of the society, the Hon. M. P. Wilder, some of the vice-presidents, and other gentlemen, friends of the cause of agriculture.

For a brief history of the farm and an acount of its management and productions, we refer to the communications of Mr. Bradford, appended to this report.

The committee, therefore, in this connection, remark generally that the principal production of Mr. Bradford's farm, is hay, for which the soil seems peculiarly well adapted. At the same time, valuable crops of grain are raised. One field of rye was remarkable, both for quantity and quality. As a particular account of this may be given by the committee on grain crops, we refer to that report, for the purpose of showing what we consider an important fact, namely, that grain crops may be made profitable in Norfolk county.

The fine mowing lands on Mr. Bradford's farm had received no top-dressing for six or eight years. But the after-crop was permitted to remain, to serve the double purpose of guarding the roots from the winter frost and enriching the ground the following season. The committee remark, in conclusion, that an elegant simplicity and taste characterize the premises of Mr. Bradford; and we hope he may receive a reasonable profit in addition to the great and constant pleasure which the possession and intelligent cultivation of such a beautiful farm naturally furnishes him.

The committee award to S. D. Bradford, of West Roxbury, the society's premium of $25.

The other farm, visited by a part of the committee, is situated in the town of Wrentham, and is owned by James S. Wiggin, Esq. In the communication of Mr. Wiggin, annexed to this report, will be found a detailed account of his various operations upon his farm, which appear to have been conducted with characteristic energy. Great improvements have been made on his premises during the short period of two years. But great as they are, they are only the beginning of a series of improvements, which it is his purpose to carry forward to full completion. With this statement and reference to his communication the committee award to James S. Wiggin, of Wrentham, the society's premium of $15.

The committee beg leave to express the earnest wish, that others will follow the examples of Mr. Bradford and Mr. Wiggin, and offer their farms for premiums. There are, doubtless, in our county, many farms which do honor to their proprietors, a knowledge of which, would be beneficial to the community. One of the important advantages resulting from associations like this, is, to make the knowledge possessed by individuals, available to the public, thus becoming the common property of all. Our county is highly favored in having within its limits, not a few distinguished agriculturists and horticulturists, who have spared no pains nor expense to add interest to our public exhibitions, thus promoting the advancement of the great cause in which we are engaged.

Ralph Sanger, *Chairman.*

Statement of S. D. Bradford.

The farm, which once belonged to my father, and which I inherited at his decease in 1825, was purchased by him in 1789, and consisted of thirty acres, a part of which was woodland, and all in a very rough and uncultivated condition. A great part of it was so covered by stones, and even by large rocks, that had any one made the attempt to sow seed upon it, very little would have fallen upon the soil or produced any return. In 1795 an addition was made to the farm by the purchase of twenty acres more, called "Abbott's pasture," which remains to-day in nearly the same state as when it was bought, sixty-one years ago, and is used for the pasturing of cattle.

In 1854, I purchased another farm adjoining the paternal estate, containing about one hundred acres, of which about thirty acres consist of woodland, and what is called swamp, containing large deposits of muck, now so much used in composting manure. My whole farm, therefore, consists, at present, of about one hundred and fifty acres. Its length is 1,756 paces by 600 paces broad, and is all together, and very compact.

The land mown over this year was about seventy acres. I put into the barns one hundred and thirty-eight loads of hay, most of which was of the very first quality, besides eight to ten tons of rye straw and several loads of rowen. I suppose the loads to average about a ton, but it is possible they were less. Some were double loads, drawn by oxen, and some packed, on what is called "the hay rigging," drawn by one horse only. I have gathered corn from about six acres, of the kind called "Pembroke," and have two acres of carrots, which I hope may yield from thirty to forty tons of that useful vegetable.

I have sent to Mr. Wilder an account of the field of winter rye which attracted so much attention the day the committee and gentlemen favored me with a visit, and was not a little surprised when I received an account of the weight of the straw. The reapers remarked in the field, "that they had never seen any thing equal to it, even in the old country."

You are so familiar with the nature of the soil in West Roxbury, and so much at home upon all the subjects of agriculture, that I doubt my ability of saying any thing more, which is not known to you already. No one can doubt the fertility of

the land in this vicinity, and by using a sufficiency of manure I could make each acre give a very large return, especially of grass, and of a superior kind. Land, which, with only a small quantity of manure, will produce from forty to forty-five bushels of rye to the acre, must be admitted to be of good quality, and ought to pay a profit.

I have said nothing of the ancient house in which I continue to dwell, at a considerable sacrifice of comfort, especially during our long and severe winters. I have attempted, in vain, to discover the year in which it was built. In looking over, however, "Dr. John Elliot's Biographical Dictionary of the settlers of New England," I find a statement by him that it was built by Col. William Dudley, who was the grandson of Thomas Dudley, one of the first settlers of Massachusetts, and who came over in the Arabella. His father was Governor Joseph Dudley, and he died in 1743. Dr. Elliot, in his life of him, says: "He graduated at Harvard College in 1704, applied himself to the study of the law, but did not incline to enter upon the business of his profession. In a retired spot of the town of Roxbury, he built an elegant house, and cultivated his farm." From this we may conjecture the house was built from 1710 to 1720, and, of course, is now about one hundred and forty-six years old. Several parts of the interior work, tradition says, were made in London, particularly the stairs and banisters, which are still in a good state of preservation.

Second Statement of S. D. Bradford.

I beg leave to report, that the quantity of land planted with corn this season, upon my farm, was about six acres. The spring being wet, it was planted very late, and part of the seed having failed, two large fields had to be planted a second time with the Canada yellow corn, which ripens early. The weather was so cold in August, that fears were entertained that the corn would not ripen, but the subsequent warm and dry weather soon removed these apprehensions, and we gathered four hundred and fifty-three baskets, in the ear.

I have grown, this season, about eighteen tons of carrots,—the large orange,—on two acres which had been sown with this vegetable in 1854–5, and had produced a large return. I expected from thirty to thirty-six tons, and impute the dimin-

ished production, in part, to having used on one acre De Burg's super-phosphate of lime, instead of barnyard manure. Some other vegetables, also, to which it was applied, did badly, whereas the carrots, which were manured in the usual way, gave a satisfactory return.

The season being so late and cold, I planted only about ten bushels of potatoes. A quantity rotted, and some, when dry, were not much larger than walnuts. In former years, I have planted Chenangos as early as the 14th of April, and had a very good crop.

I have grown a few tons of ruta bagas this season, which have done quite well. I produce, of other vegetables, only sufficient to supply my own table. In ordinary years, I have a fair supply of apples. Last year I had one hundred and thirty-nine bushels of cider apples, and fifty barrels of selected fruit gathered by hand, and fit for table dessert.

In pears, I have only a moderate supply, but of the best kinds; the Seckel, in particular, does well in West Roxbury. Some years I have a great abundance of peaches.

I have two farm horses, one yoke of oxen, three cows, and seldom vary from this number.

I have used upon my farm, this year, about one hundred cords of manure, all of which was taken from the barnyard or stable, except about twenty cords of muck, taken from a part of my farm, where there are large deposits of the very best quality. I have also used 3,450 pounds of phosphate of lime.

From the Statement of J. S. Wiggin.

In regard to my crops I shall speak generally. I have kept no detailed account the present year, but have gone on making improvements, cultivating a land, purchasing implements, adding to my stock, furnishing my house, and charging all to the cost of the farm; probably, another year, I may open a profit and loss account with the farm.

Two years since found me in possession of a farm, containing about twenty-three acres, entirely run out—buildings in shocking condition. I sent a carpenter from Boston, with orders to make certain repairs and alterations, which he did, at a cost of from $3,000 to $4,000, during the fall of 1854.

The first of May, 1855, I came to the farm with my family, and passed six months. During that period, I added to my stock three cows, one yoke of oxen, one farm horse, twenty-one swine, some of which were fattened and sold. I purchase implements as fast as they were required, until I found my farm amply supplied, having no occasion to trouble my neighbors by borrowing. During this period, I added to my farm sixty acres, consisting of woodland, pasturage and mowing. It now consists of eighty-three acres.

I also built a long range of substantial stone wall, four fee high, and trenched below frost. I also built an avenue to my house, leading from the road, across a pond, in which I had constructed a flume, partly of wood, the balance stone. Having a large supply of water at the head, which is constantly supplied from boiling springs, induced me to put in a hydraulic ram, and convey the water to my buildings, which has proved invaluable; yielding an abundance, saving much labor, and enabling me to have the same facilities for bathing and water closets, as the Cochituate does the residents in Boston, besides all other purposes for which the element is needed.

During this period, I planted several acres of the cereal crops, using only one ton of Mexican guano, which proved to be of little value, and some ashes, which I made from sods and brush, which were scraped together for the better improvement of the farm, and wintered the stock before enumerated.

In October, I sowed from three to three and one-half acres of winter rye, and two or more of winter wheat, from which I had a fair yield. Had these crops been put in at the usual season of the year, they would have been large, particularly the wheat, but circumstances would not admit of getting the seed in earlier. The ground for wheat was prepared with barn manure and slacked lime, during the summer. The seed, before sowing, was immersed in strong brine, all foreign substances skimmed off, and then shaded over in a trough, adding slacked lime, until the seed separated, and every kernel was encased, and better grain I never have seen.

After spending the winter in the city, the first of May found me again upon the farm, and I found my stock, of every kind had not been idle. The barnyard and cellar were full of manure, and with my experience of the past season, I had something to

do with, and could really begin the business of farming. The flume before noticed, enables me to draw down the pond, in which is deposited a rich, vegetable substance known as muck. I took out fifty cords. Two good hands, with wheelbarrows, will take out six cords a day. It having had the action of the winter, I mixed it thoroughly with one ton of Peruvian guano. On land thus prepared, I planted eight acres of corn—different varieties; Canada, King Philip, eight-rowed, and Webster, manuring in the hill about four acres of potatoes—different varieties, one acre of white beans, one-half acre of carrots, besides the usual quantity of sweet corn, garden vegetables, pole beans, &c., say one and a half acres, and my neighbors were astonished at the result of the muck and guano. The cost of the two ingredients when prepared, was estimated at $3.50 per cord.

In addition to the crops, I sowed about four acres of barley and two of oats, which gave me good crops; this ground was manured from the barnyard; all my crops are upon sward land, broken up this spring.

My fruit trees, which consist mostly of grafted apples, have received my personal attention. Last year they were much injured by caterpillars. I have conquered them this year,—scarcely a tree having a nest upon it, and bearing more or less fruit. I dug around them, transplanted some, scraped all that were worth preserving, took up those that were not, and washed them twice with oil-soap suds.

Upon my farm are about seven acres of meadow, which I ditched through the centre, four feet in width and three feet deep, preparatory to reclaiming them. In my stone wall, where required, I have erected gates, instead of bars, as they are more secure and save labor. I am now constructing a cement drain from the house to the barn cellar, through which can be conveyed all the drainage of sinks and water-closets. Finding that my old barn was too small, I have added two wings, one for a stable, 23 by 36, the other 36 by 36, with two good leantoes, which together make a building 87 by 36, with paved and cemented cellar under the whole, divided into pens for hogs, with drive way from end to end; also a cemented cellar for roots, under a building which adjoins the barn, in which will also be set kettles for boiling food for the swine. My pens are made of spruce

plank, five feet high, let into grooves, so as to take out easy. The troughs, set half in and out with swing doors, so that the hogs cannot trample while feeding, nor waste food—besides, the troughs are always kept clean, being raised upon a platform two and a half feet.

Out of a building upon the farm, I constructed an ice-house, which holds fifty tons. The ice is taken from my pond at very small cost, giving a supply for all purposes, of that, now, almost indispensable luxury. An open shed, forty feet long, will soon be finished, facing the barnyard; also, upon the other side of the yard, a pen for poultry in connection with a house for the same, of which I have about two hundred.

I have added to my stock this year a pair of carriage horses, one cow, four sheep, (cossets,) and hope to raise my own lambs for the table next year. My swine number upwards of forty, young and old. Have sold some pigs, and intend to slaughter ten fattened hogs this fall and winter.

Soon as time will permit I shall continue enclosing my farm with stone wall, a part of which has already been done.

The expenditures this year upon barn and out-buildings, not far from $3,500. The cost of the ram $26; pipe-laying and plumbing, $175. My farm is bounded upon three roads; therefore, I am not much troubled with division fence.

It is now stocked with five cows, one yoke of oxen, five calves, four horses, four sheep, and forty swine. My poultry consists of turkeys, hens and chickens of the old barnyard stamp, which I think the best breed for eating.

Thus have I given, in as brief a manner as the subject would admit, the information desired. If it will be of any service to you as the committee of the agricultural society of Norfolk county, you are at liberty to use it; and although of little worth, still if I can do any thing that will inspire new vigor, and cause to be rejuvenated the old neglected farms in Massachusetts, then I shall feel amply rewarded for what little I have done or may hereafter do in the service of the cause of agriculture.

RECLAIMED SWAMPS.

MIDDLESEX SOUTH.

From the Report of the Committee.

The committee on whom devolved the duty of examining and reporting on reclaimed swamp lands, having performed that service, offer the following report as the result of their doings.

The claimants for premiums were four, to wit: William Buckminster, of Framingham; John, and Curtis Chamberlain, of Southborough, and one of the members of the committee.

The sensations produced by witnessing such swamps and meadows as theirs,—originally cold, dreary and dismal,—so thoroughly reclaimed, cannot but be a source of delight to all beholders, especially to the owners thereof, and those whose tastes harmonize with such improvements.

The grounds of Mr. Buckminster, and those of the other claimants, contain, in the aggregate, more than twenty acres, and yielded upon an average, more than two tons of hay per acre, affording the best possible proof of the utility of such improvements.

It is no longer an experiment but an admitted fact, that such reclaimed lands are more productive, and yield a greater profit than any other, in proportion to the amount invested in improvements, and it is gratifying to observe the progress annually made in this kind of improvement. Different local circumstances may require a somewhat different process to be adopted, but the committee are satisfied from their limited experience and observation, that unless it be possible to drain such lands, all attempts at reclamation are futile and visionary.

The statement made by William Buckminster on a former occasion, contains a general description, and probably as universally applicable as any other. He says: "My mode of turning cranberry bog into English mowing ground, was to cover all the wild grass and vines with gravelly soil from the islands in it and the adjoining higher grounds, having first cut ditches to drain it completely as nearly four rods asunder as the lay of the land

would permit. I bring the whole matter on the surface in August without cutting, because the loam, &c., carted on, kills out the wild growth more effectually at that season, and when the tops are completely buried the old plants die much sooner than if cut with a scythe. I hauled on fifteen ox-cart loads of compost manure per acre, and sowed one peck per acre of Herds-grass and two pecks of redtop. Late in the fall I sowed four quarts of northern clover, not expecting it to vegetate before spring. Since the first sowing I have put on another dressing of compost, equal to the first, and my crops continue good. I have mown this for the last three summers.

"The old pine swamp with peat bottom, was cleared in a different manner." The brush were cut, dried and burned, and the pine stumps dug out. "This I find to be the only sure mode of reclaiming this swamp. I have now about four acres thoroughly subdued in this way. The cost of subduing in this thorough manner, and sowing down, including draining, is full fifty dollars per acre."

The reclaimed land of the brothers, Messrs. John and Curtis Chamberlain, was very similar to the "old pine swamp" of Mr. Buckminster, and the course pursued by them was substantially the same as that pursued by him. The large pine stumps on the land of Mr. John Chamberlain were converted into charcoal, and the other combustible materials burned on the ground, together with the combustible portion of the surface of the swamp, the alkaline properties of the residuum undoubtedly having a powerful effect in neutralizing the acidity of the peat bottom and rendering it very productive. The particular lot entered by Mr. John Chamberlain, for premium, was covered with a most prolific crop of corn, potatoes, &c., beautifully contrasting with the unsightly, unreclaimed, and wholly unproductive adjoining land. The grounds of Mr. Curtis Chamberlain presented a beautiful appearance, several acres being covered with a thick vegetable carpet. He has, as your committee learned, been a recipient of the society's bounty for his judicious management.

The ground belonging to one of your committee, and offered for a premium, was neither "an old pine swamp, nor cranberry meadow," but what is known in common parlance, as a bog meadow, having a small brook, running over it in zigzag water-

courses, thus making a congenial home for snakes, frogs, turtles and other amphibious reptiles, and producing a medium growth of bog grass, small bushes and kindred growth, the meadow being so low in most parts that a common shower rendered it necessary to pole out what little it produced, as no team could walk upon the water-covered surface. The water of the brook was subsequently confined by digging a ditch about three feet deep, and four feet wide, to limits beyond which, in ordinary circumstances, it was not arrogant to proclaim, hitherto shalt thou come and no further; and here shall thy, hitherto, overflowing and flooding waters, be staid.

The natural descent of this brook thus confined is in most parts not more than about four inches to a hundred feet. The ditch is stoned up about two feet on each side, and the remaining height, grassed over, standing back, at an angle of forty-five degrees, thus making the tops about six feet wide. The cost of this ditch and finishing in the manner described, was not less than $2.75 per rod, an expense not necessary for merely agricultural purposes, but being situated so conspicuously and surrounded with dwellings situated in its immediate proximity, it seemed to require this additional expense. Every three or four hundred feet, a dam is put across this brook in order to raise the water, during summer, to within about fifteen inches of the surface, and also in time of a freshet, to stop the water at proper seasons of the year, thus causing a rich and fertilizing sediment from the high land to be deposited on the surface of the ground. The confining of this brook to one channel, would have had but little beneficial effect, had not the cold subterranean springs been cut off at the sides of the meadow grounds. This was effected in most cases by digging a ditch on the border of the hard land adjoining, to the depth of three feet at least, and laying a covered drain with stones, say about one foot in the clear, and covering the whole with gravel to the depth of two or three inches, in order to fill all the insterstices, so that no sediment would be carried into the covered drain by the action of the water, percolating through the same from the top. Cheaper methods have been adopted to drain lands,—such as filling the ditches with small stones, setting up flat stones edgewise in a slanting manner, meeting at the top,—but drains thus constructed, in most cases will, in a very few years, be totally unfit

for the purposes intended. The whole body of the small stones will become impervious by the sediment, filling every opening and crevice, and some of the flat stones will get displaced, completely closing up the drain; while those constructed properly, will remain unimpaired for generations. Some, thus constructed more than thirty years since, are now in all respects as perfect as when first made. It will, therefore, probably be found less objectionable to leave drains wholly open than to adopt an imperfect method of covering them.

The land, last described, after being properly drained, has, in most cases, been covered with three or four inches of gravel, and cultivated with fallow crops one or two years at first, and occasionally afterwards.

The first attempt, some thirty years since, to plough swamp land, was the occasion of many shafts of ridicule, dealt out with unsparing hand upon the owner, he being represented as spoiling his swamp,—of being a fool, crazy, with many other kin red epithets; but he has outlived such prejudice against that kind of improvement, and has the satisfaction of beholding a verdant lawn, producing annually, with ordinary culture, from two to three tons per acre, instead of a dismal morass, covered with coarse grass, reeds and bulrushes, and in not having the evening rendered hideous by the croaking concerts of frogs and kindred reptiles, and swarms of mosquitos serenading in every room, where repose is sought in vain, on account of their incessant buzzing.

SETH DAVIS, *Chairman.*

HAMPSHIRE.

Report of Theophilus P. Huntington.

Two premiums were offered for the best experiments in reclaiming swamp lands, not less than one acre, commencing in 1855. Entries were made by Messrs. David, Kelita and Avery D. Hubbard, of Sunderland, of different parts of a reclaimed swamp of thirty acres. Drains had been dug at proper distances, and an outlet forced, at great expense, through a stubborn rock. The unprofitable swamp has become productive

and valuable. The committee award to David Hubbard the second premium, and recommend gratuities to the other competitors.

David Hubbard's acre was broken up in the spring of 1855, was thoroughly dragged and planted to potatoes, which yielded a crop of one hundred and twenty-five bushels. In May, 1856, he ploughed, harrowed, and planted Indian corn on three-fourths of the piece, and manured with two bushels of ashes in the hill, and hoed twice. The yield was thirty-seven bushels. The remainder was planted with early Carter potatoes, and produced eighty-one bushels. The value of the crops of 1855–6, was estimated at $110, the expenses at $29, and the net profits, $81. The increased value of this acre is estimated at $70.

Kelita Hubbard's acre was burned over in 1854. In 1855 it was planted with corn and potatoes, and in 1856 with oats, rye and millet for fodder.

Avery D. Hubbard's acre is the same described in Flint's Agriculture of Massachusetts for 1854, p. 71, and in the Hampshire Society's Transactions for 1854. It has produced good crops of hay the past two years. He estimates the net profits on this acre, for four years, including the increased value of the land, at $135.80.

ORCHARDS.

MIDDLESEX SOUTH.

From the Report of the Committee.

The committee recommend more premiums on apple orchards, to encourage farmers to set out and cultivate more fruit. The apple, we are inclined to think, is the fruit best adapted to general cultivation in New England, and the one whose cultivation will be found most profitable.

Obed Winter, *Chairman.*

Statement of Charles Twitchell.

My orchard contains thirty trees. I purchased my farm in the fall of 1836, and this orchard was then in a very bad condition. By its appearance, it had run wild for years. The tops were very thick, and the ends of most of the limbs were dead. In the spring of 1837, I gave it a good faithful trimming, taking off nearly a third of the tops. I then scraped the trees, ploughed the ground and planted it with potatoes. By keeping the ground ploughed and trees trimmed, they soon became healthy. I then grafted them, and in three years they commenced bearing, and have yielded handsome fruit ever since, and are still in a healthy, flourishing condition, and most of the trees were full of fruit this year.

Ashland, Sept. 17, 1856.

NORFOLK.

Statement of Thaddeus Clapp.

My peach orchard, offered for premium, contains one hundred and forty-six trees, set out, a part, in 1854, the remainder in 1855. They are from stocks raised on the place, and budded with the large early Crawford variety. The trees, when set, were two years from the bud, and stand in rows, fourteen feet apart, and at intervals of twelve feet in the row. The trees of one row are placed, not at right angles with those of another, but obliquely, so as to receive to the best advantage the sun's light. Perhaps a greater interval between the trees would have been better; but it was expected that, by an annual shortening-in of the branches, they might be kept within due compass.

The trees have borne fruit the past season, but only in small quantities, having suffered from the effects of cold the previous winter, in common with others throughout the country.

In pruning, the shortening-in method has been followed, the object being to give a round apple-tree shape to the tree, and to prevent overbearing. The time selected for this purpose has usually been the last of March or beginning of April.

For the prevention of the borer, various remedies have been tried, but none with so much success as whitewashing. This

was done two or three times during the season, commencing about the first of July, and repeated at intervals of three or four weeks. The wash was applied to that portion of the trunk extending from the surface of the ground, twelve to eighteen inches above and two to three inches below, the earth being removed to this depth, and a careful examination made for the borer at the same time. After whitewashing, the earth was replaced and hilled up about the trunk three or four inches. This method has usually been found sufficient to protect the root; but if prevented from despositing its eggs there, the insect will not unfrequently resort to the forks of the branches, or any wounded or diseased spots, unless similarly protected; so that to insure complete exemption from its attacks, a careful inspection of these parts is necessary.

Another insect noticed in the peach tree, is a small beetle, not larger than a grain of mustard seed, of a black color, which makes for itself a lodgment in the bark, causing the gum to exude, and so giving an unhealthy appearance to the tree. It is found in considerable numbers, the latter part of summer, imbedded in the bark, particularly of old trees, and its perforations then may be easily mistaken for those of the young peach borer. The injury, however, which it does, is much less than that of the borer, and may be prevented also by the application of a coat of whitewash to the whole trunk.

Dorchester, December 6, 1856.

Statement of John W. Shaw.

The apple orchard which I offer for premium was planted on high, dry and strong land, in April and November, 1852. It consists of one hundred and five trees; eighty Baldwins, fifteen Rhode Island Greenings and ten Russets.

The holes were made four feet in diameter and two feet deep, and a one horse-cart load of compost of swamp-mud and loam was put into each hole before setting the trees. In 1853, I raised a crop of oats, and laid down the land to grass; but the grass not taking well, in November 1854, I ploughed it in, and in 1855 raised a crop of potatoes, and the present year of corn.

Grantville, November 14, 1856.

HAMPSHIRE.

Report of the Committee.

Dr. Trow, of Sunderland, has a hundred apple trees set upon a rich piece of ground, in the rear of his house. The trees are very straight and thrifty, and exhibit good care. If the varieties prove to be what the Dr. supposed when he purchased them, they will soon repay his care and labor. The apple orchard entered by John R. Robinson, of Sunderland, contains sixty trees—fifteen less than the rules require. His trees are set upon a side hill, are very large and thrifty, and show good treatment. We hope Mr. Robinson will set fruit trees on the remainder of his lot, as the soil is well adapted to their growth.

The reclaimed apple orchard of Kelita Hubbard, of Sunderland, shows what can be done with old, unsightly apple trees. His trees are scattered about his farm, and most of them do well. By scraping, manuring and grafting, he has single trees, which produce several barrels of apples.

The nursery of William Hunt, of Sunderland, we found in good condition, well stocked with apples, but without other fruit, if we except a few small pears. His trees have a good growth, and he has none but the best varieties. We would suggest to all who are setting fruit trees, to be very careful whom they purchase of, and to get only the best varieties.

William P. Dickinson, *Chairman.*

Statement of Kelita Hubbard.

The land on which my orchard stands, varies from sandy to wet gravel, and I have thirty trees which have been reclaimed. Their ages vary from twenty to one hundred years. They had been neglected for many years, were considered almost worthless, and bore but very few apples. The best limbs were grafted, and the others taken off. I have usually taken three years to remove the old limbs, and have been particular to have this and the grafting done by an experienced hand, that the top may be well formed. I have been careful to remove all the young

sprouts, once or twice a year, and have endeavored to keep them in a healthy condition by labor and manure.

I have grafted with Greenings, Baldwins, Seek-no-furthers, Nonesuch, Boston Russets, Pippins, and many other varieties. The orchard now produces a hundred bushels of apples.

FRANKLIN.

From the Report of the Committee.

Seven entries were made for premiums, of apple orchards, and three, for peach orchards. The committee believe they are able to report an increasing and commendable interest manifested in the cultivation of fruit trees. And why should it not be so? It is too late to make it necessary to go into an argument to prove the utility of the apple or peach tree, the grape vine or the currant bush. Are they not on every farm? If not, they ought to be. What with so little trouble and expense can furnish the proprietor, even of a small plot of ground, so much satisfaction and comfort, as a few fruit and ornamental trees and vines? The blossoms of spring, the cooling shade of summer, and the changing hues of autumn, together with their luscious fruits, combine to render trees, shrubs, and vines objects of beauty, comfort and profit.

A practical application of science was shown the committee, by Mr. Arms, he having two apple trees girdled by mice, had ingeniously inserted a few scions, the ends being suitably shaped for the purpose, under the bark above and below, and covering the wound with wax or earth, the scions had increased in size, and the trees indicated vigor and thrift.

The committee would observe, that in order to secure growth in fruit trees, care must be taken—

1st. In setting thrifty and vigorous trees, they should be so stocky as not to require supporting at the top with a stake and string. If your object be profit, do not try to cultivate the fancy or new and untried varieties, but secure a few sorts only of established reputation for growth, bearing, and quality.

2nd. Let your ground be well prepared and well manured, but let no heating or stimulating manures come in contact with the roots of the tree.

3d. Let the hole for the tree be dug larger each way than the roots extend; fill up with fine and fertile soil, even should you be obliged to go to your corn-fields or garden after it. After putting the tree in its place do not move or shake it, but scatter in the dirt slowly, and press it carefully about the roots, which should be in contact with earth and in their natural position.

4th. The trees should be mulched with leaves or litter in summer, and in place of which there should be a mound of composted manure in winter, to be levelled in the spring.

5th. The ground around and between the trees should be cultivated for a few years, preference being given to some of the root crops. An occasional wash of soap-suds or weak lye upon the bark is beneficial.

N. Austin Smith, *Chairman.*

FOREST TREES.

NORFOLK.

From the Report of the Committee.

We are surprised that, notwithstanding the liberal premiums offered by this society, and the strong inducements otherwise presented to farmers, the growth of forest trees has received so little attention in Norfolk county. The cost and consumption of fuel and timber is already creating serious apprehension for the future, and would justify any reasonable measures to remove it. True, it is said, that the amount of woodland in the county is greater now than it was twenty-five years ago, although the quantity of merchantable wood and timber is less. But we believe that this statement rests mainly on the fact, that the value of woodland has so increased, within the given period, that many acres are now suffered to remain in their natural state, which would otherwise have been cleared and devoted to tillage or pasturage, and that many pastures are now covered with scattered pines, birches or other trees, where, otherwise, the brushwood would have been extirpated. On the slightest

survey of the county, one is struck with the great number of acres to be seen where the soil is light, capable of affording only the scantiest herbage,—often covered with moss,—or yielding occasionally a meagre crop of rye or corn,—scantily repaying its cost, which might be covered with beautiful and productive forests, and thus add, every way, to the attractiveness and value of the homestead.

But while few systematic attempts have been made, within our knowledge, to cultivate forest trees on any extensive scale, we are happy to notice the instances of successful endeavor, in this direction, to which our attention has been called; and we cannot but hope that others may be incited by them to give to the subject that consideration which it deserves.

Mr. Whiting Metcalf, of Franklin, entered for inspection a plantation of pines and birches, covering three and a half acres. This plantation was begun about twenty years ago,—when its proprietor was nearly three-score years old,—and he now lives to reap the mental satisfaction, as well as the pecuniary returns, of an entirely successful experiment. Upon the western border of his large and valuable farm, a swell of land, with a soil of light, sandy loam, and a subsoil of pure sand, had been sown, for many alternate years, with rye and grass seed, without any fair equivalent for labor. This land was subsequently sown,—one-half of it with seeds of the pitch-pine, which grew rapidly, and encouraged the sowing of the other half, some years afterwards, with seeds of the white-pine. For some reason, these did not germinate as uniformly as the others had done, and seeds of the birch tree were then sown in the vacant spots. The result is, that Mr. Metcalf now has, on the half of this land first sown, one acre and three-quarters of pitch-pine trees, from which he thinned out, last spring, ten cords of small wood, leaving, on a careful estimate, not less than fifteen cords per acre of good merchantable wood. Probably these trees have grown more rapidly than usual, in consequence of the previous cultivation of the soil. But, judging from their past growth and present vigorous appearance, we think they will increase at the rate of a cord per acre, at least, for every year, until they are of sufficient age and size to be felled. Allowing this to be not less than forty years from the time of sowing, there will then be thirty cords per acre on the ground. The increased value of the wood,

at that time, will probably bear due proportion to the increased quantity of it. If the price of such wood in the market to-day is four dollars per cord, it may then be seven dollars, and the whole lot would be worth two hundred and ten dollars per acre.

This may appear, at first sight, to be no very large return for so long an investment of money. We have heard it said, that it is far better to abandon such acres, and seek a more profitable investment of capital in the fertile prairies of the West. And we confess that for an immediately gainful return, the prospect at the West may be far more inviting; but, in addition thereto, must be taken all the discomforts and disadvantages of the change of residence, in comparison with the familiar comforts and advantages of a New England home. But it is idle to start the question of comparative remuneration in the case. Here are three acres of light and almost barren soil, and the question is, whether they cannot be made productive and converted to some profitable use. We cannot abandon them. The farms and homesteads of New England cannot be deserted. We must adopt better methods of cultivation, and make better use of light and unimproved lands. We must renew and enlarge our forests, by a judicious planting of different sorts of trees for fuel, building and the arts. We must adorn and beautify spots now barren, with the growth they are best capable of sustaining, and thus increase their capacity of use to the generations that may succeed us here. In this way, we may do much to lessen the inducements which are now carrying so many of the young and active yeomanry away from their homes.

Besides, if we look closely at the mere profit of the investment, in the case before us, we may be led to regard it in a very different light. Here are three and a half acres of very light land, worth perhaps, in their present condition, fifteen dollars per acre, the interest and taxes of which would be, say, (for we do not intend an exact calculation,) one dollar. They are sown with rye one year, and planted or pastured the next. But this cultivation, it is stated, yields no greater return than would cover the cost. They would remain, therefore, unprofitable acres unless converted to some better use. They are now sown with seeds of the pine tree. These germinate well, and their growth is rapid; and at the period of twenty years we find these acres covered with a burden of fifteen cords per acre of good mer-

chantable wood, worth in the market say one hundred and twenty-five dollars; and it has cost nothing more than the planting and protecting of the trees. But it will yield its owner an interest of more than thirty per cent. per annum on his original investment. No doubt we have estimated the original value of the land above its actual or market worth. If so, there is of course an equally large addition to be made to the annual interest which the investment will yield. May we not ask if—all things considered—the prairie lands of the West are more to be desired in a pecuniary point of view? But this pecuniary profit from the investment is not all. There is a mental satisfaction derived from the cultivation and improvement of one's paternal acres,—from beautifying the spot where it has been our happiness to own our nativity,—where are the civil and religious institutions and the social advantages we most value, and where we trust our children will make their pleasant homes,—which no money can purchase.

Of the remaining half of Mr. Metcalf's lands, we shall only say, that it was sown some years later, with the seeds of the white pine and birch trees, as may be seen by his statement annexed, and that it now bears an equally flourishing growth of valuable wood.

Another plantation of forest trees was examined, belonging to Mr. Alfred H. Metcalf, of Franklin.

This plantation is upon land of similar soil, and adjoining that of which we have spoken. On the 12th of June, 1850, Mr. Metcalf transplanted to this spot, from scattered points in the open field near by, four hundred young white pine trees. These all lived and grew thriftily. In May of the following year, 1851, he transplanted four hundred more, making the whole plantation cover about two-thirds of an acre. For the precise manner in which this was done, we refer to Mr. Metcalf's statement. But one tree has failed to take root and flourish; and there stands a fine, thrifty grove, presenting to the eye a beautiful prospect, exciting in the breast of its owner emotions of satisfaction and honest pride, and promising a liberal return in money for the investment and labor.

We commend both these instances to the consideration of the members of the society, with the assurance that, if any one is disposed to examine these plantations, his visit will be received

with pleasure by the Messrs. Metcalf, and rewarded with ample gratification.

Having spoken of the growth of forest trees in the county as a subject of great importance, and of this in only one of its bearings, it may be expected that we should proceed to a fuller and more elaborate discussion of the whole matter. But we have neither the time nor the means at hand for pursuing these investigations. Happily, no discussion of ours is necessary, as none could approach that already before the public, in the admirable Report on the Trees and Shrubs of Massachusetts, by George B. Emerson, Esq., of Boston. We earnestly invite attention to that Report, which contains the most extensive and reliable information on the subject. It is greatly to be desired that a new edition of this work should be published, at a cost which will enable every farmer and citizen of the Commonwealth to possess a copy of it.

Charles C. Sewall, *Chairman.*

Note.—Since completing this report, we have learned from a perfectly reliable source, facts which lend much support to the encouragement for giving greater attention to the growth of forest trees in the county.

A member of the society, who has devoted a long life to the labors of the farm, and whose good judgment and industry are proved by the result of his labors, has informed us that, just forty years ago, he planted a field of two acres upon his father's farm with corn and potatoes; that since that time there have been cut from the same field, two separate growths of excellent birch wood, of at least twenty cords per acre, and that there is now standing upon it a third growth of the same kind of wood, for part of which he has just been offered six dollars per cord for mechanical uses. The field received little care and attention after the cultivation mentioned above. Around the walls of it, white birches were suffered to remain at that time, from the seeds of which, scattered by the winds and the birds, the whole grove, it is supposed, has sprung.

The same gentleman also states, that he once had in possession another field, of like soil and dimensions, which was overgrown with small brushwood of birches, which he wished to

destroy. He attempted to accomplish his purpose by cutting down the young trees, in the month of June,—a process which, he had been assured, would certainly kill the roots. The attempt was given up, after cutting over one-half the field. But, in the month of September following, he found there, to his astonishment, a new growth of young birch trees, nearly or quite as large as that which had remained untouched on the other half of the field. He is now done with cutting young birch trees in the month of June, in order to kill their roots.

Statement of Whiting Metcalf.

My plantation of forest trees contains three and a half acres. The soil is a light sandy loam, and the subsoil sand. About one-half of it is of pitch-pine; the other half of white pine and birches. I raised rye upon the land every other year for several years, but found it did not pay the expenses. I then procured some pitch-pine seeds and sowed them on the rye stubble, and harrowed them, which was the only expense. This was done about twenty years ago. The seeds came up too thick, in some places, but I suffered them to take their course until last spring, when I thinned out of the lot about ten cords. This leaves the remainder ample room to grow, and, it is the opinion of competent judges, that there are now fifteen cords to the acre upon the ground.

The other half of the lot was sown three or four years afterwards with white pine seeds; but the seed did not come up well, and the next year I sowed birch seed to fill all the vacancies. I now have a handsome lot of white pine and birch trees.

Franklin, September, 1856.

Statement of A. H. Metcalf.

The land on which my plantation of forest trees stands, consists of a poor sandy loam, and was considered nearly worthless. In the year 1850, on the 12th of June, I set out upon it four hundred white pine trees. In the following spring, about the last of May, I set out nearly an equal number. The plantation

now contains about eight hundred trees, and occupies two-thirds of an acre of ground.

I transplanted these trees from an old pasture near by, when they averaged about two feet in height, and with a sod around them six or eight inches square. I ploughed furrows in the land eight feet apart, and placed the trees four feet distant from each other, in each furrow. Then with a hoe I drew the earth over them, as far as was necessary to cover and protect the roots.

The whole expense did not exceed four dollars, and for this I now have a beautiful and thrifty grove of pine trees, averaging from eight to ten feet in height.

FRANKLIN, September, 1856.

The committee also append the following statements compiled chiefly from Mr. Emerson's report.

"The object of this report," says its author, George B. Emerson, Esq., "is to describe the trees and forests of Massachusetts, to set forth their importance, their general and particular relations, uses and properties, and the modes by which they may be preserved, propagated and improved."

It would be fitting to our purpose to reprint the whole of Mr. Emerson's Introductory Essay on the uses and improvements of the forest. But the space it would require forbids. We have, therefore, selected such parts of it as best comport with our design.

It will readily be seen that the value and usefulness of this report are in no degree diminished by the natural and social changes which have taken place since its publication in 1846. The only material difference between its applicability to that period and the present, is in the statistics by which the author measures the worth and the uses of the forests. The increase which has accumulated in the quantity of wood consumed for fuel and in manufactures and the arts, is truly astonishing; and the fact should serve to impress most strongly upon the mind of every farmer the importance of attending to his forest trees.

We shall present a table of statistics, showing the present use and value of wood, drawn from a source similar to that of the

one made use of by Mr. Emerson, in the preparation of his report, exhibiting the facts, in part at least, as they existed at the close of the year, ending June 1, 1855.

Mr. Emerson describes the uses of forests as follows:—

1. Forests create, or gradually and constantly improve the soil. The roots penetrate deeply, and thus let in the air, to produce its slow but sure effects. The radicals decompose the grains of sand, and extract from them elements essential to the soil; they drink in moisture, and the carbonic acid gas, which has been formed beneath or brought down from the atmosphere; and from these several elements, acted on by heat, light and air, in the leaves and by that unknown influence, vegetable life, are formed the various substances which compose the plant. The annual deposit of the leaves and the final decay of the branches and trunk, go to constitute the mould upon which other plants grow. And the soil thus formed is kept by the thick matting of the roots from washing away.

2. Another use of forests is, to serve as conductors of electricity between the clouds and its great reservoir, the earth, thus giving activity to the vital powers of plants, and leading the clouds to discharge their contents upon the earth. The forests also coat the earth and keep it warm in winter, shutting in the central heat, which would otherwise more rapidly radiate into space and be lost. They act not less favorably as a protection against the excessive heat of the summer's sun, which rapidly evaporates the moisture and parches the surface.

3. Forests protect a country from the violence of winds. The laws of the motion of the atmosphere are similar to those of water. A bare hill gives no protection. The wind pours over it as water over a dam. But if the hill be capped with trees, the windy cascade will be broken as into spray. Its violence will be sensibly diminished. Hence, a garden, surrounded by tall trees, admits of the cultivation, even in our severe climate, of plants almost tropical.

Forests not only protect from winds, but prevent their formation. The air, resting over a broken surface, cannot be rapidly heated to a uniformly high temperature, so as to rise upwards in great masses and create a violent wind.

4. As adding to the beauty of a country, the forests are of the utmost importance. A country destitute of them cannot be in the highest degree beautiful.

5. In a country so much exposed as ours is, in consequence of the remarkable clearness of the atmosphere, to the burning heat of the sun, the use of trees for shade is not one of the least important. A tree which furnishes a cool shade to the inhabitants of a house, is, at the same time and on that account, its best ornament. Trees should be planted not only by dwelling-houses and along roads, but in every pasture and by watering places, and near every barn—wherever cattle, horses or sheep are to be provided for. All these animals suffer from the burning sun; and to say nothing of their enjoyment, the cost of shade trees will be many times paid back in the saving of the milk, fat, fleece, and strength which will be the consequence of their being protected from the heat of the sun.

6. The importance of the forests as furnishing materials for ship-building, house-building, and numerous other arts, is so obvious that it must occur to every one; and yet there is danger that, in many places, from false views of immediate economy, no provision will be made for the wants of future generations. It is not easy to estimate the pecuniary value of the wood used in house-building. A vast deal of this is continually going on; the aspect of the State is annually improving by the erection of large, better finished and more commodious houses, barns and out-houses. And almost all the materials have been, hitherto, except for the seaport towns, furnished by our own woods. But no returns of these improvements are published. The thousands of tons of timber, boards, clapboards and shingles, are not put on record. It is manifest, however, that the difference against us would be great, if we had to look elsewhere for our materials.

The effects of the wasteful destruction of the forest trees are already visible. A very large proportion of the materials for ship-building, house-building and manufactures, in the towns along the coast, are now brought from other States. Every mechanic who works in wood, looks every year more and more out of the State for his materials. Every year we are more dependent on Maine and New York and some of the southern States, not only for ship-timber and lumber for house-building, but for materials for tanning and dyeing, for carriage-making, basket-making, plane-making, last-making, and for furniture and the implements of husbandry.

Even these foreign resources are fast failing us. Within the last quarter of a century the forests of Maine and New York, from which we draw our largest supplies, have disappeared more rapidly than those of Massachusetts ever did. In a quarter of a century more, at this rate, the supply in many places, will be entirely cut off.

7. Another special use of the forests of the State is in the production of maple sugar. Great quantities are already made, and the manufacture might be much more generally introduced. In many favorable situations, the cultivation of the maple tree would cost only forethought. The labor of planting the trees might be performed late in the year, when the fall's work was over, and the making of sugar be attended to early, before the spring's work had begun.

Of minor importance, but of much more than is usually given to it, is the production of nuts of various kinds, the fruits of forest trees. The produce of the shellbark, chestnut, beech, hazel and acorn, already valuable, might be increased almost indefinitely, by selecting the best native varieties, and improving them by processes similar to those to which we owe the fine varieties of apple and pear, and the cultivated varieties of European nuts, and by introducing similar trees, such as the pecan nut, the English walnut, and the European hazel.

8. The most extensive and important use of the forest is in the fuel it furnishes. Most of the fires through the State are still chiefly fed from this source."

The population of the State, according to the last census, is about 1,100,000. Suppose each family to consist, on an average, of five persons, and we then have 220,000 families in the State. Suppose the quantity of fuel required for the use of each family to be, on an average, six cords every year, and the average price of all kinds of wood to be $5 per cord. Then the annual cost of wood consumed for fuel in our houses is $6,600,000.

By the last annual reports of the several railroad corporations, we learn that the expense of wood for fuel consumed by the locomotives, during the year, was . . $1,288,838 00
which, added to the amount above, . . . 6,600,000 00

making an aggregate of $7,888,838 00
as the annual expense of wood for fuel in the State. Much

wood is, undoubtedly, supplied from foreign sources. But, regarding our estimate of the home consumption as within moderate bounds, and connecting it with the statements of the railroad reports, we are compelled to believe that a much greater quantity of wood is annually prepared for market than what appears in the returns of the assessors; that instead of being estimated, as it is, at $2,960,915, its value should be at least $4,000,000.

From the Report on the Industry of Massachusetts, prepared by the Secretary of the Commonwealth, from returns by the assessors of the several cities and towns, we learn that the annual value of wood consumed for fuel, and of manufactured articles of which wood is a material, was, in the year, ending June 1, 1855, as follows:—

Firewood, prepared for market,	$2,960,915 00
Charcoal,	237,460 00
Lumber, including shingles, clapboards, &c.,	3,664,462 00
Chair and cabinet ware,	3,969,982 00
Sashes, doors and window blinds,	936,959 00
Musical instruments, (cases, legs and other wood,)	361,150 00
Boxes, of all sorts,	997,783 00
Casks,	802,374 00
Wooden ware,	745,711 00
Lasts and shoe pegs,	192,350 00
Making an aggregate of	$14,869,146 00

The materials of these articles are drawn almost entirely from the forests. There are other articles, of which wood forms one of the materials, estimated as follows:—

Vessels,	$4,643,450 00
Boats,	130,166 00
Masts and spars,	247,638 00
Blocks and pumps,	314,510 00
Railroad cars, coaches and other vehicles,	2,352,955 00
Ploughs, and other agricultural implements,	707,175 00
Shovels, spades, forks and hoes,	894,515 00

Saddles, harness and trunks, ...	$1,220,049 00
Mechanics' tools, ...	1,142,614 00
Friction matches, ...	95,750 00
Making an aggregate of	$11,748,822 00

We omit several articles, such as brooms, brushes, clocks, fire engines, and the bark used in tanneries, railroad-sleepers and fencing materials, all of which would add not a little to the quantity and value of wood and timber consumed in the State. And it should be observed, too, that the returns of the assessors, from which these facts are derived, are pronounced, in the report, very imperfect, and that if full and exact, might swell the aggregates.

We have, then, one aggregate of $14,869,146, from which, only, the expense of labor is to be deducted; and another of $11,748,822, from which the expense of labor and of the different materials used, is to be deducted. How large these several deductions should be, we are not able to state with any precision. Allowing them to equal seven-tenths of the whole amount, and this we regard a large allowance, the net value of wood prepared for market, and of wooden materials used in different manufactures, in the year ending June 1, 1855, would be $7,985,396. And this labor and manufacturing has given employment to at least 125,000 persons, and support, doubtless, to five times as many.

We proceed, now, to make further extracts from Mr. Emerson's report, and present his remarks on the continuation and improvement of the forests.

Planting trees on a large scale, has been seldom attempted in New England. The inhabitants of the towns have been content with the kinds of wood growing in their neighborhood; or, where particular kinds not to be found there, were necessary for the manufactures already established, they have been satisfied to import them from a distance. In very few instances, have systematic efforts been made to provide a future supply of the best materials, in their own immediate vicinity. This is to be done. The individuals interested in a particular branch of manufacture may say, that when materials fail them in one place, they will go to another. The owners of the land ought

not to rest satisfied with this view of the case. True patriotism and enlightened views of economy, ought to prevent any one from consenting to it.

Massachusetts must necessarily continue to be a manufacturing State, and the manufactures in wood are among the most important branches of industry, and must be not only continued but enlarged. They cannot even continue, unless care is taken to plant forests which shall furnish the necessary materials. One by one, the workers in wood will have left the State, when all the old forests shall have been cut down. A prudent foresight may prevent this, by planting in season, the kinds of trees necessary for these various demands,—for fuel, and for all branches of manufacture. For this end, we have extraordinary resources. Among the native trees, we have great choice, from the number, variety, and excellence of the species. In the narrow breadth of Massachusetts, the species of native timber trees are more numerous than are found in any kingdom of Europe. We have nine species of large oak trees, four hickories, five birches, three large maples, three ashes, three pines, two walnuts, two elms, two spruces, two cedars, besides the beech, the chestnut, the horn beam, the lever wood, the tupelo, the hoop ash or nettle tree, the tulip tree, the plane, the bass, the locust, the hemlock, the fir, the hackmatack, the cherry, the holly, several poplars, many willows, and a large number of smaller trees. Besides these, it is found that all the valuable trees of middle and northern Europe flourish here as if they were native.

It thus appears that our soil and climate are perfectly well adapted to all kinds of trees which are found in temperate countries. It is only necessary to understand the character and habits of each, and to choose suitable soil and situation.

It will not be considered foreign to our purpose, to enumerate some of the more important of the objects which should be kept in view in the cultivation and extension of our forests, and the native and foreign trees best suited for those purposes.

The first want, as has been shown, is fuel. The trees best suited to the purpose, are the hickories, the oaks, the beeches, the birches, the maples, and the pines, particularly the pitch-pine; and the chestnut and hemlock for close furnaces. If fuel is to be used in the form of charcoal, the hard woods only are of great value, particularly chestnut, the birches, alders, oaks and

maples. As materials for house-building, the pines, the spruce and the hemlock, are generally employed.* Floors are sometimes made of beech, of birch, and of ash. The best materials, probably, are oak, yellow pine, and spruce.

For ship-building, oak is considered preferable to any other wood. The best kinds are white oak, iron oak, and black or yellow-bark oak. In the construction of most of the ships of Europe, great quantities of larch are used. This tree might be profitably planted on thousands of acres which are now unproductive. Small vessels, remarkably light and durable, have been wholly made of pitch-pine. This tree grows well on sands so barren as to furnish nourishment for no other tree. Pitch pine is also used, in preference to other timber, for the upper works of large vessels, and for top-masts. White pine is also used, especially for decks, as it retains the oakum in its seams; and for the knees, hackmatack and spruce; and rock maple for keels. Spruce and pine are also used for the upper spars. For boats, cedar and oak are necessary.

For fencing materials, chestnut and cedar are found most durable. The former is remarkable for its rapid growth. White cedars grow most luxuriantly in wet swamps, where nothing else will flourish. The various native and foreign thorns, the hemlock and cedar, and numerous small trees, furnish fit materials for hedges, which, in many parts of the State, must ultimately take the place of fences.

Furniture, of the most ornamental kinds, is now made of our beautiful maples, birches, cherries and beech. Tables of extreme beauty are sometimes made of the root of oak, or maple, or birch. These four trees, with the oaks and pines, must continue to be indispensably necessary for the manufacture of chairs, tables, bedsteads, and other kinds of furniture.

For implements of husbandry, the ashes and hickories, the lever wood, the hornbeam and the oaks, must always be wanting. The carriage-maker and wagon-builder will want ash for springs and frames, white oak for spokes and shafts, white oak and elm for hubs, and white wood or bass for pannels. The

* Chestnut is extensively used now, instead of pine, in house-finishing, in the manufacturing of cabinet ware, piano-fortes, &c. The lumber of old trees makes a good finish, and a beautiful appearance when oiled or varnished.—Ed.

basket-maker will want young white oaks, ash and willows; the plane-maker, beech; the last-maker, maple; the pump-maker, oak, chestnut and pitch pine; the bucket-maker, white and red cedar and pine.

The tanner will continue to want the bark of the black, the white, and the chestnut oak, the hemlock and the birch; in regard to all which there has hitherto been great wastefulness. And the dyer will want quercitron, or black oak, sumach, bayberry root, in addition to foreign stuffs, for some of which he might substitute the bark of alder, birch, and some other native shrubs and trees.

Many acres now under cultivation, and poorly repaying the labor spent on them, might be advantageously sown or planted with pines. Oaks, birches and pines are often found growing among rocks, where no soil can be seen. The rock chestnut-oak, the black birch, the red cedar, and the hackmatack, flourish in such situations. Of sedgy marsh and swamp, too wet and cold to be cultivated, without extensive and costly draining, many acres, in the eastern part of the State, have been sown, by a natural process, with the seeds of the white cedar. The seeds, when shed, float upon the water, and are carried by spring tides and freshets, and left upon the surface of the ground. In the summer, they spring up in countless multitudes. What has been done, in these instances, by nature, indicate the process by which similar grounds may be reduced or restored to the condition of forest.

Much is to be done for the improvement of the woodlands now existing. In some cases, they are managed with great care. The best means of thinning, pruning and felling are studied and practised. But, in many cases, indeed, in most instances, they are left in utter neglect. The principle on which thinning and pruning should be conducted, is a very plain and intelligible one. It is that every tree and branch should be allowed to have ample supply of air and light. When, therefore, two trees are so near that their branches extensively intermingle, one should be removed; and generally, it should be that one which is much taller or shorter than the neighboring trees. In pruning, that branch should be shortened which encroaches on other branches of its own, or another tree.

In many hard wood trees, shoots spring vigorously from the

stool or stump, after the tree is cut down; and this mode of re-production is chiefly relied upon in most of the woodlands of this State. It becomes, then, of great importance to ascertain what are the best modes of felling, whether by thinning out or cutting entirely down; in what period a wood, so cut down, will renew itself, so as to be profitably cut again; at what age of the tree the stump will shoot most vigorously; at what age, if any, trees cease to shoot from the stool; what trees will not thus shoot; what season of the year is found best for felling a forest, when the object is to have it renew itself speedily; and what season, when the object is to destroy the forest.

In felling for timber, the practice is to select suitable trees, from any part of the forest; for fuel, it has now become nearly a universal practice to cut clean. Experience has uniformly shown this to be the most economical method.

The white birch is of most rapid growth, and springs at once from the stump. This may be profitably cut in from ten to twenty years; a growth of maple, ash, and birch, black, yellow and white, in twenty to twenty-five; oaks, in from twenty to thirty-three. Where the trees are principally oak, the forest may be cut clean three times in a century. Cedar swamps, which grow from seed, cannot be profitably cut in less than forty years. Pitch pines require from forty to sixty years to be in a condition to be felled. In many places, the experiment has been tried of burning over the surface, ploughing and sowing with rye. When the trees were of hard wood, this practice is strongly condemned. In the case of pitch pines it is recommended. The seedling pines make the most rapid progress when the surface has been softened by cultivation. The trees, best for fuel, shoot again most readily and grow most vigorously when cut under twenty-five years. The wood is formed within that time as rapidly, taking a forest together, as at any other age; and for fuel, it is then of most value. Stumps of young, healthy growing trees shoot most vigorously. They should not be under fifteen years, nor much over twenty. Shoots will not come from very old trees. Evergreens never give permanent shoots from the stump. Several persons, who have attended to the growth of the sugar maple, say that the stump of this tree makes no shoots; and the same is said of the beech.

The convenience of the wood-cutter will generally lead him to

fell the forest in the early part of the winter; and, probably, taking into consideration both the quality of the wood cut and the welfare of the future forest, this may be best.

When the object is to destroy the growth, summer is universally declared to be the best season to fell the forest.

It is among the things most unfavorable to the growth of trees, to gather the leaves, as is frequently done, either to burn, or add them to the compost heap. This is bad economy. The other circumstances particularly unfavorable to the growth of trees, are browsing, pruning, a thin soil, exposure to sea breezes, to high winds and to frosts. The first of these, completely within the control of the forester, is the browsing of cattle. All animals should be entirely excluded from woodlands intended to renew themselves.

I have already spoken of pruning. Where the object is wood, it may be doubted whether any pruning is advisable, except in the case that the branch of one tree materially interferes with the growth of another. Plants receive food by their roots, and digest and convert it to their various products, by and in their leaves. Both roots and leaves should, therefore, be left to extend and expand themselves as freely as possible. Whatever checks this expansion has a tendency to lessen the product of wood.

On thin soil, the roots cannot penetrate far, and a tree, surrounded by others, will soon exhaust the proper nutriment within its circle, and must then begin to fail. As soon as this happens it must be removed, and trees of other families must be sown or planted in its stead.

Most forest trees are injuriously affected by the sea breeze, and we generally find them stunted and dwarfed by its influence. The remedy is to plant, numerously, the hardiest trees along the seaward border.

Wherever trees are planted for use in the arts, it is important to give them the most rapid growth possible. Of wood growing on the same soil, that which grows most rapidly is strongest. That of which the circles or grains of growth are narrowest is also weakest.

The strength of trees is proportioned to the weight. And as young trees grow more rapidly than old ones, so they are more valuable as fuel.

It has long been known that summer or early autumn is the season most favorable for the felling of timber, where the object is strength and durability. Nearly a quarter of a century ago, Timothy Pickering showed by experiments which he adduced, and by sound reasoning, that summer is better than winter for this purpose. A writer in the New England Farmer, who "has wrought more timber than most men, and for more uses than he knows of," is satisfied that September is the best time for felling trees; and that if the tree be disbarked in June, and allowed to stand till September, the timber will be stronger and more durable; and that timber felled in September will not suffer from red rot or from powder post.

The naturalist, Buffon, after numerous experiments carefully made on a large scale, and continued through many years, arrived at the conclusion that nothing contributes so much to the solidity, strength and durability of timber as completely stripping the trees of their bark some years, at least three, before they are to be felled. This should be done in the spring, when the bark is most easily separable. Timber, managed in this way, was found to be sometimes a fourth part stronger than that from trees in the same forest, and in all other respects precisely similar, treated in the usual way; that is, felled with the bark on, and dried under the open sky, or under sheds.

In regard to the planting of forests, Mr. Emerson remarks:— All the birch trees, especially the black and the white, are so valuable for timber and for fuel, that their cultivation should be earnestly recommended. They flourish on all kinds of soil, even the poorest, spring most readily from seed, and grow very rapidly. "Birch seed ripens in September and October, and may be either gathered and sown immediately, or preserved in a dry loft and sown in spring." "It is scarcely possible," observes Savy, "to cover birch seeds too little, if they be covered at all." The plants, if sown in autumn, will come up in the following March or April. If sown in spring, they will come up in May or June, which, in very cold climates, is the preferable season.

"Young birch plants taken out of coppice woods when about two years old, are found to root much better than seedlings of the same age and size, taken out of a regular seed bed; doubtless, because, in the latter case, a greater portion of the tap root requires to be cut off.

"In France and Germany, plantations of birch are frequently made by sowing the seed where the trees are intended finally to remain. For this purpose, the poorest soils are harrowed in humid weather, in the month of October or November, and fifteen pounds of seed, as it is taken from the catkins along with the scales, is sown on an acre, and afterwards covered with a bush harrow. It is observed by Michaux, that burned soil is peculiarly favorable to the growth of the birch, which, in America reappears as by enchantment, in forests that have been burned down."

The pines are most readily propagated by seed. If the trees are to be propagated artificially, the seed must be deposited on or near the surface; it should not be buried beneath, or in case this is absolutely necessary, as when they are sown in open fields, the covering should not exceed an eighth of an inch, and should be light and loose.* A soil and surface formed by the decay of the leaves of deciduous trees is best, as it is precisely that in which the seed naturally vegetates. All pines require to be cultivated in large masses. They naturally grow thus, and although, when so growing, they seem to be extremely hardy, they do not thrive when solitary, but are parched by the sun, and stunted by the cold and wind.

The cones, which are mature after one, two, or three seasons, may be gathered in the winter, as the scales do not usually open to allow the seeds to escape till the spring.† The best time for sowing the seeds is early in the spring, as soon as the frost is out of the ground. When poor, thin, rocky or sandy soil is to be clothed with wood, and it is important to save the time and expense of the several transplantations, the seeds may be sown where the trees are intended to remain. They must be sown abundantly, as they are liable to destruction by various enemies. On a rocky surface, they may be cast into the crevices of the rocks, or beneath the thin soil which covers them. On an open plain, they require protection, which may be found in various

* All experimenters in the artificial propagation of forest trees should be careful not to bury the seed too deep, especially of the pines, birches, maples and elms.—Ed.

† The demand for pine seeds, as well as for the seeds of other forest trees, has become such as to make it an object for persons who have an opportunity, to gather them for the market.—Ed.

low bushes, such as sweet fern; or, if sown on on a waste, sterile land, they must be sown with the seeds of some quick growing shrub or tall grass, which will protect them for two or three years. For the first two or three years these plants are of slow growth; but after the fifth, they grow very rapidly, and continue, in favorable situations, to make one or two feet annually, until they have reached twenty or thirty feet; and in case of the taller species, a much greater height. The roots, in most species, penetrate at once, in the first or second year, to the depths of one or two feet, but never much deeper.

The evergreens are transplanted with less facility and success than most deciduous trees. All the pines, are, however, successfully transplanted, if sufficient care be taken not to injure the roots nor heads, and to have a pit sufficiently large for all the roots to be fully spread, and not to set them too deep. The most difficult, are the white, and pitch pines. To insure success, these should be transplanted in winter, the pits having been formed and the plant to be moved having been surrounded by a circular trench in the previous autumn. In this way, the whole of the roots, with the frozen earth adhering, may be removed, and set at once in the pit, and surrounded by loose earth kept for the purpose.*

On account of the very valuable qualities of the wood, the hackmatack (American larch) deserves to be extensively cultivated, and there are thousands of acres of cold and swampy land where it grew naturally, which are now unproductive, and which might be clothed with it. It has, however, been found to be far inferior, in rapidity of growth, to the European larch, which very nearly resembles it in appearance and in the excellent qualities of its wood. This, therefore, should be preferred, as likely to produce, in the same time, a larger quantity of timber from the same surface, and at the same expense.

On favorable soils, the European larch is fit for every useful purpose, in forty years' growth. Its annual rate of increase, in

* White pines, ten or fifteen feet in height, have been transplanted, in the autumn, and with entire success, in the grounds of H. H. Hunnewell, Esq., of West Needham. It is not so essential that transplanting be done in the winter as it is that a large circle of earth be taken with the tree, thus preserving the roots from injury. With this precaution, evergreens have been successfully transplanted in July.—Ed.

Scotland, has been found to be from one to one and a half inches in circumference, at six feet from the ground, on trunks from ten to fifty years of age. It has, moreover, the property of flourishing on surfaces almost entirely without soil, thickly strown with fragments of rocks, on the high and bleak sides and tops of hills, where vegetation scarcely exists. The most desirable situation is where the roots will neither be drowned by stagnant water in winter, nor parched by drought in summer.*

The value of oak timber is already great, and is constantly and surely increasing, from the diminution of the home supply, and the increased difficulty of getting it from abroad. All kinds of oak are of so slow growth, and the number of years necessary to create a forest so very great, and dependence on a foreign supply so unsafe, that it is important that means should be immediately taken to convert into future forests some of the many thousands of acres susceptible of this, which are now lying waste. In consequence of the great cost of labor in this country, it is desirable to sow the acorns where the trees are to stand, if any way could be contrived to defend them from the mice and squirrels; and this may probably be done by sowing a sufficient quantity to allow for the destruction caused by these animals.

As to the management of the acorn, the following extract from Loudon will give the most approved mode:—"The acorns need not not be gathered from the tree, but may be collected from the ground immediately after they have dropped; and, as in the case of other tree seeds, they may either be sown then or kept till spring. If they are to be kept, they should be made perfectly dry in the sun, or in an airy shed, mixed with dry sand, in the proportion of three bushels of sand to one bushel of acorns, or with dry moss, and then excluded from the air and vermin." The French nurserymen make the acorn, or other seed, germinate in moist earth, or saw dust, and, before planting it, pinch off the end of the root. This causes the plant immediately to throw out side fibres. For the same purpose it is the practice, in England, either to transplant the oak after one or two years' growth, removing at the time a part of the tap root, or to cut it off, without removing, by inserting a spade, obliquely,

*A very valuable account of every thing relating to the whole cultivation, management and uses of the larch, is found in Loudon's Arboretum, pp. 2353–2399; also, pp. 104–5, Agriculture of Massachusetts, for 1854.—Ed.

six or eight inches beneath the surface. In either case, the plant had several roots to depend upon, in place of its single, original tap root. In some cases, after it has grown in the place where it is to remain for two or three years, it is cut down to the ground; it will then throw up vigorous shoots, and send down perpendicular roots. All but the most promising of the shoots may be carefully removed. This has been tried with marked success by the Rev. Morrill Allen, of Pembroke, who has paid much attention to the cultivation of the oak.

The oaks are better fitted than almost any other trees, to stand along the borders of cultivated fields; because, where the soil is deep enough to allow it, they send their roots to a considerable depth, and thus disturb but slightly the growth of grass and other herbaceous plants and low shrubs.

These extracts from Mr. Emerson's valuable "Report on the Trees and Shrubs of Massachusetts," now out of print, contain many important and valuable suggestions, worthy of the careful consideration of many farmers in this Commonwealth, who possess waste and unimproved lands, be they rocky, gravelly, sandy, or swampy,—no matter how sterile and unproductive, according to Mr. Emerson's views, which are, now, more than theoretical, for they have been confirmed by actual experiments in various parts of the State, with different trees, and on a variety of soils, thus making them, to some extent, a part of the history of improved agriculture. Such lands may be made valuable and productive plantations of the native, or foreign species of forest trees.—Ed.

PLYMOUTH.

From the Report of the Committee.

In the supervisor's report of last year, we were informed, that although this society had for several years held out encouragement for experiments in the propagation of forest trees, suitable for ship-timber, yet no claim had ever been entered. Not many years since a middle-aged man would hardly venture to plant an orchard for himself, with any expectation of eating of its fruit—so slow was the progress of human events, and so certain the event which soon calls the husbandman away from his labors,

and his fruitions. But the mighty progress of improvements which have been realized, has taught, that the reward soon follows the faithful and persevering effort to render one's life useful. And the man who, even in old age, plants a tree, and cultivates it with care, may live to enjoy the fruits of it for successive years, and even though he should not eat of its fruit, the sweet satisfaction of witnessing its rapid growth for a single year, and feeling that he has done something for the benefit of posterity, is a rich compensation, which one who never tried the experiment cannot appreciate. It is gratifying to see and note the change which is visible in this respect.

Two claims have been entered the present year for the premium offered "for the most extensive forest, of any sort of trees suitable for fuel or timber, raised from seed, not less than one thousand trees to the acre, which shall be in the most flourishing condition, and more than five years old in September, 1862." One of these, by the Rev. Morrill Allen, of Pembroke, who, by his faithful care, and counsel, and contributions to this society, has done so much for its advancement to its present state of prosperity;—and who, though scarcely expecting to see the day when this premium shall be awarded, yet having loved and cherished this society from its infancy, still loves it, and wishes to lend his example, and exert his influence for its prosperity so long as he has the ability.

The other of these claims is by Mr. Philip Brewster, of Hanson, another of the fathers of this society, and whose efforts for its prosperity are still vigorous in old age. It is hoped that the sons of the present generation will imbibe the spirit of the fathers, and resolve that they will never, by their apathy, deserve the appellation of degenerate sons of worthy sires.

Freeman P. Howland, *Chairman.*

Bridgewater, November 6, 1856.

Statement of Solomon Hayward.

The lot of land on which I planted white pines contained one hundred and fifty-three rods, it being a gravelly hill, of little value for cultivation. I planted the seeds October, 1829, in hills five feet three inches distant from each other, each way,

with four seeds in a hill, and covered one-fourth of an inch with earth. I took a small crop of rye from the lot, in the fall of 1829, which is nearly all that has been grown on the lot for over fifty years. The lot is in my pasture, and many of the trees have been killed by the cattle. Many of the seeds sprouted in the fall, and died in the winter. I think the best time for planting pine seeds is from December to March. The trees were trimmed in June, 1855, and many of the poorest cut out. There is now 708 trees standing, which produce seeds.

My second lot contained one acre and sixteen rods of land, for which I paid eight dollars per acre. I cut what little grass there was for several years, but found it did not pay the labor and expenses. I sowed the lot to white pine seeds, broadcast on the grass, in December, 1840. There is now 3,019 trees on the lot, in a growing state. I also sowed many thousand seeds on the adjoining lot, among some scattering trees, which I have not counted, and they appear to be doing well. I have not trimmed them.

My third lot contains two acres and fifty-three rods of land, with 3,726 white pine trees on the same. The seeds were sown broadcast on the grass. About one-half were sown in December, 1840; the remainder in March, 1841, in a snow storm, to prevent the birds and squirrels from destroying them. I have not discovered any difference in their coming up, or growing.

The lot on which the trees stand, cost me seven dollars and fifteen cents per acre, fenced on three sides, and bounded east by Taunton River. The lot has been much infested with alders and briars, and other kinds of bushes; but I have nearly subdued them. I have expended about twelve days' labor in digging up and cutting bushes on the lot, since they were planted. The rise of the river is the principal cause of bringing in the alders and other bushes, as it many times covers a large portion of the lot.

My fourth lot (small lot) of 169 white pine trees, was sown on the grass, March, 1841, a small portion transplanted about the same time, or a little after. The land is a poor, worn out piece, unfit for cultivation.

My fifth lot lies on the Taunton River, separated from my third lot by a run of water. The quality and price of the land the same as lot No. 3, with many bushes and briars. I cleared

off the brush in the fall, and sowed white pine seeds, broadcast, in March, 1850, on nearly three-fourths of an acre. There are now 1,064 trees on the lot.

My sixth lot (small lot) of pitch pines, planted in sward land, March, 1848, with 309 trees, is a very thin piece of land, and stony. The several lots on which my pine trees are growing, did not pay for cultivation, forty years previous to planting the trees. I think now these lots would be considered worth four times as much as they cost me, including my labor.

1st lot,	708	trees,	.	.	. 153	rods of	land.
2d "	3,019	"	.	.	. 176	"	"
3d "	3,726	"	.	.	. 373	"	"
4th "	169	"	perhaps,		. 60	"	"
5th "	1,064	"	.	.	. 110	"	"
6th "	306	"	perhaps,		. 28	"	"
	8,992				900	"	"

Or 5 acres and 100 rods. This averages nearly ten trees to the rod. I presume that I have nearly or quite 4,000 white pine trees growing in several lots where there were some scattering trees, sowed at different times, which I have not counted. Perhaps they cover in all, something like two and a half acres.

Statement of George Wood.

In behalf of the estate of Richard Sampson, who put in his claim for premium on forest trees, I would say that I administered on the estate, and that I have not found any account among the papers of his doings on the subject. But from his widow and neighbors I have learned the following: Mr. Sampson first began by planting white pine seed; they did not come up well, and were partly deemed a failure. He then began to transplant pine trees from the woods. The change was so great, taking young pines in the shade and setting them in the sunshine, that a great portion of them did not grow, but withered away. He then took them from the open field and the roadside; the result was that they nearly all grew well. He has set some 8,000 or more trees in rows, from six to eight feet apart. They were set from May to October. He said the best time to transplant is the last week in May or the first in June. As near as I can learn, he began to transplant about 1844, and continued

to set at times, to 1853, mostly from 1847 to 1851. They were set chiefly, on thin, barren, worn out soil that he purchased, and not worth cultivating for any other use. They were set on from twelve to fifteen acres, as near as I could judge without actual survey. Some were set on small pieces of land; about that I did not know of when the committee came to view. If Mr. Sampson had lived, he could have given a very important and interesting account of his experiments in the cultivation of forest trees.

Statement of Jonathan Copeland.

The tract of land planted and transplanted with forest trees, entered for the society's premium, payable in 1856, is high, poor land, and had been exhausted by frequent croppings. In the fall of 1847 I sowed the land to rye; had a small crop. In 1848, in February, I sowed pine seed, procured the fall before, and also sowed again the first of April, on the rye; neither sowing came up well. The seed I sowed in April germinated better than the former. In 1850, I transplanted white pines and some white birches. I think the best months to transplant are April and November. Where young trees can be obtained, I think that transplanting is far better than sowing the seeds, and less work. Two men can set out five hundred young pines in a day, and that is enough for half an acre.

If transplanted, they should be from ten to twenty inches high, when moved. In transplanting, we gain five to six years in the growth, and nine out of ten will live, if properly set. The land I entered for premium contains seven acres and a quarter.

These statements, detailing the results of experiments in forest planting, are very encouraging. The whole area of the State is 4,491,812 acres. Of this, it is stated in recent returns, that there are 729,792 acres of woodlands. There were also returned, 995,000 acres of unimproved lands, and 360,000 acres denominated unimprovable lands, thus showing an aggregate of nearly one-half the area of the State that is not under improvement. The planting of the seeds of forest trees, if intelligently and economically conducted, will convert much of this unproductive land into profitable and productive forests.—Ed.

HEDGES.

NORFOLK.

From the Report of the Committee.

But one entry has been made for a premium, the present year. By invitation of Mr. Francis Marsh, of Dedham, the committee visited his grounds and inspected his hedges on the 7th of July. The visit afforded much pleasure, from the extent of the hedges, the order in which they are kept, and their vigorous and healthful appearance. The length of Mr. Marsh's hedges, which are of buckthorn, is nineteen hundred and twenty-four feet. They are of different ages, and the plants nine inches apart. That about his garden and house lot is the longest in a continuous line, being eleven hundred and seventy-four feet. A part of this has been set eleven years; other parts, not so long. The whole is in a fine condition, presenting, when in leaf, an exceedingly pleasant object to the eye. Near this, and in full view, on the road side, is a hedge one hundred and fifty feet in length, inclosing a triangular space, in which stand several beautiful maples. This hedge has been set eleven years, and is doing well, forming, together with the maples, an object very agreeable to the sight.

But the best of Mr. Marsh's hedges, and one which was viewed with great admiration, remains to be noticed. It bounds his lot on Court Street, and is in all six hundred feet in length in a straight line. A part of this has been set but three years, and three and a half feet high, wedge-shaped, the plants being in a single row, as in all Mr. Marsh's hedges. The other part of this hedge has been set thirteen years. From this, in summer, when in leaf, it is difficult to take off the eye, so beautiful and symmetrical is it. The sides are perfectly smooth, presenting one dense, unbroken mass of foliage. It is three hundred and fifty feet in length. The sides are sloping off, the hedge measuring at the surface of the ground seven feet, and three feet across

the top, being four and a half feet in height. This hedge appears to the committee to be as perfect as any thing of the kind can be. It is impervious, smooth, regular, and in every way beautiful. The committee cannot close their report without expressing the very high satisfaction which the visit to Mr. Marsh's grounds afforded them. Mr. Marsh is a genuine lover of trees and foliage, and by his liberality and efforts in different ways, has done much for the ornament of his native village.

The committee take great pleasure in awarding to him the first premium on hedges, $10.

EBEN WIGHT, *Chairman.*

PLOUGHING.

HAMPSHIRE.

From the Report of the Committee.

Ploughing must be considered the *ground*-work of all good farming, and the sturdy ploughman we honor as the backbone and regulator of society. To him we award the double honor of causing "two blades of grass to grow where, before, there was but one;" for, without a deep and thorough pulverization of the soil, combined with proper culture, we cannot expect to see any great results in the art of husbandry.

What constitutes good ploughing? This question has been discussed with reference to the merits of deep or shallow ploughing, of wide and flat, or narrow and sliced furrow, and of subsoiling or bringing the subsoil to the surface, until, amid "confusion worse confounded," many farmers are ready to repudiate all book-farming, and plod along in the beaten track their fathers trod. Observation and experience have, however, produced some practical results, and we shall venture to express our own views of some of the more important requisites of good ploughing.

A wonderful improvement has been made in the construction of the plough. The ancient, crooked stick, tipped with iron,

requiring all the strength and ingenuity of the holder to even scratch up the surface of the ground, has given away to the elegantly finished subsoil, the stubble, and the double, or Michigan ploughs—which seem almost like things of life, so well adapted are they to the purposes for which they are designed. It is a matter of the first importance, that we select a plough of size and construction suited to the soil we wish to cultivate. Next in order comes the team, which must be well fed, well trained, and sufficient to overcome the draft with ease, moving strongly and evenly in the furrow; and last, though not least, a careful and experienced driver, who practices *suasion*, rather than *too free* use of the lash or goad. In the use of single teams of horses or oxen, it may be a matter of economy for the ploughman to manage the team himself, though we are by no means a stickler for the old proverb,—

> "He that by the plough would thrive,
> Must himself both hold and drive."

With such an outfit, any man of moderate skill and judgment may manage the plough, and leave behind a smooth and evenly turned furrow. Most land should be ploughed deep, or subsoiled, which will render it both more retentive of moisture, and less liable to be affected by drought. Our own experience is, that the depth should be attained gradually, as too much of the subsoil thrown upon the surface at once, will injure the soil for a few years. Loamy land, with rich subsoil, may be ploughed deep without any such results. Reason and experience must be our guide, but as safe a rule, perhaps, as any, is to "make light lands heavier, and heavy lands lighter." The width of the furrow must be in proportion to the depth, in order to turn it properly. We prefer a wide, flat furrow on most soils, as it completely covers all vegetation, causes the turf to rot sooner, and is much easier cultivated.

But we were reminded by what we saw at the ploughing-match of the Hampshire Society, that it is much better to be a *doer* than a *preacher* of ploughing. The difficult land, ploughed with accuracy and skill, rarely excelled at any exhibition in the State, testifies to the ability of the farmers within the limits of the society.

Agriculture should be protected and encouraged. Not only

is she the mother of the arts, but to her votaries must we look for the actual necessaries of life, as well as for the stability and prosperity of our government. We pity any, who, with silly self-conceit look with derision upon the sturdy ploughman, with his huge, honest hand and weather-beaten brow. Let such but follow the plough beneath a scorching sun, and breathe the pure air of heaven, and the delicate form and sickly hue will give way to the sinewy arm, and to a countenance glowing with health. Thus shall the plough become the benefactor of mankind; the spear shall be beaten into pruning-hooks, and the sword into ploughshares; nation shall not lift up sword against nation, neither shall they learn war any more. Be it ours to award to the husbandman the dignity and honor which are so justly his due.

"In ancient times, the sacred plough employed
The kings and awful fathers of mankind:
And some, with whom compared your insect tribes
Are but the beings of a summer day,
Have held the scales of empire, ruled the storm
Of mighty war: then, with unwearied hand,
Disdaining little delicacies, seized
The plough and greatly independent lived."

CHARLES H. FIELD, *Chairman.*

FRANKLIN.

From the Report of the Committee.

The Committee on the Ploughing Match having attended to the duty assigned them, make the following report:—

Were we to have but one criterion by which to judge of the comparative advancement of empires and races in refinement and the useful arts, could we select any thing more reliable than the state of their agriculture, with the implements for the performance of its labor, and the estimation in which the performers of said labor were held? And among those implements, the plough must of necessity take the pre-eminence.

The Romans, in their palmiest days, and before their subjugation by the Northmen, called a ploughman from the plough

to wield the civil power, and bear the highest honors in their gift. Yet did Cincinnatus return gladly to his labor again, when his country no longer needed his public services. England, when the age of chivalry intervened between the dark ages and her present enlightenment, had little respect for her ploughmen. Scott makes his Sir Water Raleigh say, in derision of his companion, "Thy shoulders have the stoop of the *ploughman*." Be it ours to reverence and honor the stalwart, intelligent ploughman.

The plough is both a cause and a result of civilization. By it, man turns the "howling wilderness" into a home of peace and plenty; and the almost limitless expanse of prairie into fields of waving corn and luscious fruit. He can bring up, from the unwrought storehouse of mother earth, hidden treasures, and profitably mingle things new and old. Are not the farmers in the Bay State too prone to neglect the last named privilege, and go to the far West for virgin soil, when it lies in rich abundance beneath our feet, and but a few inches below the old and well-worn earth, that our fathers have tilled and *re*-tilled, until each upturned particle wears to us the familiar look of an oft-tried friend?

What Pope said, of the acquirement of knowledge, might, with slight alteration, apply to the improvement of the soil; dig "deep," or reach not the hidden treasure. Skill should be shown in the selection of the plough, as much of success or failure will depend upon such selection. Many a penny-wise husbandman of the present day, attempts the most important labor of his farm, with an implement not much further removed from the primitive log of wood with projecting limb, which satisfies the wants of embodied laziness among African tribes, than it is from the most approved models of Prouty & Mears, Ruggles, Nourse & Mason, or Whittemore, Squiers & Co.

How revolting, to a friend of improvement, is the sight, occasionally displayed even now, of a field, called by courtesy, ploughed land, in which the turf seems broken, here a little and there a little, to the depth, perhaps, of some five or six inches; and having the appearance to the uninitiated, of having been subjected to a sudden invasion from a drove of Western swine, driven out in too great haste to admit of even an ordinarily thorough rooting of the ground. What wonder, if a

farmer, with such habits and modes of saving, finds neither pleasure nor profit in his vocation, endeavoring, as he does, to perform the fundamental work of the summer's campaign with an implement that his team can propel only by spasmodic jerks. Thankful are we that the number of this class of farmers is growing less. The plough should be adapted in structure to the work required of it. No one model is best for all soils and locations. For instance, a stiff, moist, clayey soil will dry better, and be consequently better pulverized and prepared to receive the seed, with the furrows laid at an angle of some degrees from the horizontal, than with the ploughed surface left perfectly level.

A rough, stony, tough piece of ground, requires a shorter, and more nearly perpendicular mould-board, than a level meadow, free from stones, where the grand desideratum is to turn the furrows as perfectly flat as possible.

Seven competitors for the premiums at the disposal of your committee, made entries with the secretary of the society.

Silas N. Brooks, *Chairman.*

MANURES.

ESSEX.

Report of the Committee.

The Committee on Manures report that no entries have been made for the society's premiums the present year. Evincing as it does a lack of interest in the farmers of the county, it is to the committee a matter of regret, for they deem it one of the most important subjects within the sphere of the society.

That there is gross mismanagement among most farmers in the production and application of manures, we think evident to every careful observer. We believe that upon many farms in Essex county the annual waste of manure amounts to more than

one per cent. of their total value. One instance occurs to us, where the waste from the manure heap has for years literally "run violently down a steep place and perished in the waters;" in another, the drain from the farm-yard passes into a pond by the roadside, of several rods in extent, coloring it for more than half the year to a dye much deeper than is agreeable to the sight of the passer-by. We mention these cases not because they are rare, for on the contrary they are so common as to attract no special attention.

Although the experience of the committee does not justify the conclusions of some, who think that the liquid manure from a stock of cattle is equal in value to the solid, yet we deem it very important that we impress upon the minds of farmers the necessity of providing appliances, whereby this portion may be saved and judiciously applied. We think it would be an economical outlay upon most farms to construct a tank, or cistern, to collect the drainage from the cattle-stalls and barnyard, and to apply it either to the compost heap or on grass lands.

We believe that mismanagement in the saving and application of manures may be pointed out in other respects, but we forbear particularizing deficiencies patent to every one. The committee have not sought to present striking facts or new theories, but trust that even a common-place report will not have been in vain. The simply calling attention to a subject is often the most effectual way to induce improvements therein, even though the particular way specified is open to objections. A few years since an agent of the once famed Bommer came into an agricultural community in this county, and succeeded in sponging from its members from fifty to seventy-five dollars. Superficial observers thought *that*, the most "rural" of all districts in the State, and cited this affair as complete proof thereof; but the result has proved that seldom if ever has an investment been made that returned larger dividends. We noticed afterwards teams drawing muck oftener than ever before. Large heaps of compost rose in fair proportions where the like was never seen before, and we believe that Bommer may justly claim to have been the cause of much of the prosperity which has since characterized this village, and proudly, too, if ethical writers could but prove that the end always justifies the means.

In conclusion, we would advise the farmers of Essex who

follow their vocation for profit and not for amusement, to attend more to resources within their own control, and think less, at present, of the chemists' laboratories and the islands of the Pacific; these may be well in their place, but on this subject, as on some others,

> "A little learning is a dangerous thing,
> Drink deep, or taste not."

WILLIAM LITTLE, *Chairman.*

Communication of James R. Nichols.

ALLEN W. DODGE, *Secretary, &c.*:—In accordance with your request that I should furnish you with some account of my observations on European husbandry, for publication in the Transactions of the Essex Agricultural Society, I herewith send you a brief communication. I am under deep obligations to yourself, C. L. Flint, Secretary of the State Agricultural Board, Gov. Gardner, Prof. Nash, and others, for ample facilities furnished me for observation while abroad. With the letters placed in my hands, I found ready access to all sources of information respecting soil cultivation, and to the society of those interested in promoting the great interests of agriculture.

It is apparent, notwithstanding the doubts and objections, and alleged failure of experiments, and harsh controversies in the leading agricultural journals respecting the theories and deductions of purely scientific minds, as relating to the soil and its products, that never have the mutual relationship of science and agriculture, and the benefits conferred by the former upon the latter, been more generally acknowledged in England and Germany than at the present time. The great farming experiment in that county in England after which our own derives its name,—the county of Essex,—has been eminently successful. I allude to the celebrated Tiptree farm, owned by Mr. Mechi. Here the facts and principles furnished by science to agriculture, have been systematically carried out upon a grand scale, and the results have shown the wisdom and sagacity of the undertaking. Upon this farm, we see what is accomplished by saving the liquid excrements of animals. We see the value of applying manures to the soil in such condition that it may be immediately consumed by plants, bringing them to maturity in

an incredibly short space of time. We see the results of economy and care, in saving all varieties of plant nutriment. We see the advantage of drainage, of subsoil ploughing, of correct science in the formation of compost. Here we see the great fact established, that land the most barren and worthless, may by science and skill be transmuted into fields mellow and fertile, beyond a parallel, and that the operation may be a *paying* one.

Mr. Mechi, at the time of my visit, the first of June, had already taken from his fields three heavy crops of Italian rye grass, a valuable variety, and was expecting a fourth ready for the scythe in a week. His method is, to give his grounds a thorough drenching with liquid manure as soon as vegetation begins to start in the spring, and a short time after this rich prepared plant-food is dispensed, a heavy crop of grass invites the mower to the fields. This removed, another drenching follows, and another crop succeeds; in this way, he has secured *seven* heavy burdens in a season. All the manures of this farm are applied to the land in the liquid form, and the admirable arrangements for saving and preparing, are, in some respects, peculiar.

The cattle, horses and swine are housed over brick-cemented drains, and the solid and liquid excrements fall together through crevices in the flooring, and are thence carried by iron ducts to the great cistern, where enough water is supplied to render the whole so liquid that it will pass through pipes of two-inch diameter. From thence, iron pipes are carried under ground over the entire circuit of the farm, and a pump, propelled by a steam engine, forces the liquid in dingy, odorous showers, over the fields.

The sheep, of which there are about one hundred, (magnificent animals, such as are seen nowhere else but in England,) are brought under cover each night, and their pen has a cemented bottom and surroundings, so that all the liquid of the animals is saved. The amount of this is so large, that a covering of straw is required as often as once in twenty-four hours to absorb the liquid. The whole decomposes, forming a deep mass, the richness of which is made apparent by the strong odor of ammonia which pervades the inclosure. I suggested the use of sulphate of lime to prevent this loss of volatile ammonia, and was informed that it had been applied for that purpose. This pungent smell

pervades the whole establishment, but I was told that none of the animals suffered inconvenience from it. Will not our Essex farmers who have flocks of sheep, derive some important hints from this description? The excrement of sheep approximates nearer to that of fowls and the human race in value, than that of other animals, and I think, when we take into account its great importance, that our farmers lose sight of their interests in so generally abstaining from rearing them on their farms.

Manures are applied in the liquid form very generally in Switzerland, Germany and Belgium. In the former country, in the month of May, the whole atmosphere was redolent with the strong odors. The farmers were in their fields with huge wooden vessels upon wheels, from which, with long handled buckets, they distributed it to the soil. They had already secured one, and in some instances, two crops of grass. I observed this in those elevated valleys where the seasons and climate would very nearly correspond with those of our own New England.

Why may it not be profitable for our farmers to adopt this course, and thus obtain successive crops in a single season? The hay crop is growing more valuable and important every year, and I know of no reason why it may not be much increased at a great profit, by the means described.

The use of guano and artificial manure is rapidly increasing in England. The enormous sum of $25,000,000 was expended the past year for guano alone, and a million of fresh acres of land have been brought into cultivation. This powerful fertilizer has, in many instances, disappointed our farmers, and it has in a great measure been owing to the frauds practised by dealers. Ignorant or unscrupulous dealers have, doubtless, subjected them to a great loss, in the purchase of the article, and the evil will not be removed until measures are taken to have every parcel correctly analyzed and placed under seal.

The super-phosphate of lime, as prepared from bones, is a favorite fertilizer in England. It is used on the wheat fields with great success. It is prepared mostly by large manufacturers, but in numerous instances farmers prepare it themselves. As many inquiries have been addressed to me respecting the details of the best method in the treatment of bones, I take this

opportunity of describing an easy and practical plan of manipulation.

In the first place, the bones should be reduced to a fine powder by grinding. It will not do to have them simply beaten into fragments,—they must be finely ground. After this is accomplished, weigh the bone dust, and if there are fifty pounds, take three bushels of ashes, three bushels of good earth, mix the two, and form a mound upon a barn floor or out-house, with a cavity in the centre two and a half feet wide and two feet deep. Have the walls of this cavity flattened with a shovel and made solid as possible, so as not to yield in the subsequent stirring of the bones. Place the bone dust in the cavity, and sprinkle over and incorporate into it, two quarts of water, then add very gradually six pounds of oil of vitriol, stirring constantly. The materials will foam and rise up, and should not be allowed to run over the top. Let the whole rest a day and a night, then add two quarts of water and six pounds of vitriol, as before. Allow it to again rest twenty-four hours, and then shovel the whole together, ashes, earth and paste, and it will form a rich heap ready for the field. It will be advantageous to add a bushel or two of guano to the heap, as in case there is any uncombined acid it will unite with the free ammonia and form a sulphate, which will add much to its value. The great difficulty is in the grinding of the bones. I know of no apparatus suitable for the purpose in our county.

The economy and vigilance manifested in saving all fertilizing material in England, and on the continent, is worthy of notice. In Northern Italy and other parts of the continent, our carriage was followed by children for miles, to secure the droppings of our horses upon the road. Large heaps of manure were seen by the side of dwellings, packed away as our farmers pack the pumice in straw, in cider-making. Decayed leaves, road-dust, soot from chimneys,—all is saved; nothing that will cause a plant to grow is overlooked.

In arable husbandry, it seems to me, the Belgians far exceed the English. Such fields of wheat and rye can no where else be found in Europe. Every inch of land is under cultivation, and not a blade of grass is allowed to grow even by the wayside, without repeated croppings during the summer. The field of Waterloo has not in the lapse of years forgotten the drenching

of the sanguine element, on the day when the monarchs of Europe battled for their crowns. Wheat and rye fields still cover the extended area, and the grain roots are still stimulated by the best blood of the sons of France and England.

But time, and your space will not allow me to extend the subject. I did not design to attempt method or detail in what I might present in this communication, but simply to group together a few facts, from which our husbandmen may derive useful hints and suggestions. I may, perhaps, present the results of my observations in a more extended manner, through another channel of communication, if, upon consideration, it is thought advisable.

Very truly yours,

JAMES R. NICHOLS.

HAVERHILL, November 8, 1856.

HAMPSHIRE.

Report of the Committee.

Of the three main branches of agriculture, the treatment of the crops, soils, and manures, less is known, perhaps, with certainty concerning the latter, than either of the others. Although the general effect of manures is unquestionable, their specific action is involved in obscurity.

The subtle processes by which substances, in themselves worthless and oftentimes offensive, are converted into forms of living beauty and utility, taking place as they do under conditions that elude our keenest observation; it is only by the slow process of trial, experiment and generalization, that we are able to arrive at any definite results on this important subject. Much has already been done in this way, particularly in regard to compost manure; and your committee take this opportunity to say, that while they value every practical exhibition of the importance of these manures, they have not the vanity to suppose that, after the thorough treatment the subject has received at the hands of our agricultural chemists, any crude thoughts of theirs would be entitled to consideration.

There was but one claimant for the premium on compost

manure, and this was for the making and not the application of the manure.

The Hampshire Society encourages experiments, not only with compost manures, but also with guano, and the chemical or mineral manures.

These are getting into very general use, and it is of the utmost importance that farmers should become acquainted with their actual value. Your committee consider that single trials of this kind, while they add something to the general stock of information, and bear testimony in individual instances to their value, determine nothing as to their economy or their permanent effect on the soil. For instance; if a single application of guano (though it may produce an immediate good effect) should leave the land in a worse condition than before, it may not be good economy to use it. If premiums were offered for experiments in these manures, to be continued for four or five years successively, it might lead to some general conclusion as to their permanent value.

Then, again, we want to know whether it will pay to use them. There are some who stoutly deny this, and well they may, when there is nothing but guessing to prove that they do pay. There is nothing like careful and accurate experiment to quiet all doubt in this matter. If a man has ocular demonstration in the half bushel, that it pays to use guano, or super-phosphate, and gives a handsome profit besides, he has something that he can rely upon in his future operations; and his experience may be made useful to others.

With regard to the use of guano, there are two points particularly, on which much uncertainty rests, and which, it is to be hoped, the inducements held out by the society, in the way of premiums for experiments, may be the means of elucidating.

One of these points involves the question whether the action of guano continues more than one season: the other, whether land can be kept from ultimate deterioration by this manure alone. In regard to the first of these questions, we have isolated facts, which go to show that its good effects are *not* exhausted in a single season. A case came under the observation of one of your committee, in which guano, applied on the ridges of pease in the spring of 1855, produced before the usual time for ploughing the present season, a luxuriant, spontaneous growth

of white and red clover. We might cite other instances of a similar nature, but not enough to establish a general principle. It is gratifying to know that with regard to the other point, the possibility of keeping land in good condition by the use of this manure alone, that there are intelligent and enterprising farmers among us, whose experiments will go far to settle this mooted question. We have in mind, particularly, a gentleman whose experience as given to the public not long since, already runs through a period of several years, and who is determined to satisfy himself on this subject. We incline to the opinion, that it can be done. It certainly requires good evidence to convince one that the pittance of two pounds of manure to the square rod should produce eight pounds of corn, and as much of cornstalks; but these are facts that cannot be denied, and if it will do this on the lightest soils for one year, there seems no good reason why it should not for any number of years.

What is most wanted now is some philosophical explanation of the fact. If it could be shown that guano, besides furnishing valuable food to growing crops, acts also as a solvent to substances otherwise worthless, it would relieve the agricultural public of a vast deal of anxiety.

But we leave the subject, in the hope that the farmers of Hampshire may never forget that accuracy in conducting experiments is the only true criterion of their value, either to themselves or the public.

North Hadley, 1856.

Theodore G. Huntington, *Chairman.*

Statement of S. D. Crocker.

Much has been said, as well as written, of careful saving and judicious application of manures. It has been estimated that many farmers might better husband their resources and convert into fertilizers much that is now wasted. The importance of this matter, in connection with the farmer's success, and my hope of saving much that might otherwise be lost, led me, four years ago, to adopt the practice of stabling my cows at night, through the summer season.

My stable floor is covered with muck or loam, to the depth of

five or six inches, and this is strown with leaves, straw, and any thing that will answer for bedding. These materials, as fast as they become saturated and mixed with solid and liquid manure, are thrown, through the stable window, into my hog yard; and, here, they are subjected to a continual mixing process by the swine, with fresh muck, horse-manure, ashes, plaster, old brine, &c., which are thrown into the hog pen, from time to time.

In the absence of a barn cellar, or sheds, this method, according to my experience, creates three times as much manure, as the common practice of allowing the excrements of cows to remain in the open barnyard, exposed to the wasting influences of the sun, air and rain. The liquid manure, which is supposed by good judges to be equal, in a given time, to the solid manure, is saved. The solid manure, being mixed with muck and other fertilizing substances, retains its own good qualities without waste.

I have never discovered any injury to my cows from keeping them stabled, during the warm season. They have a free circulation of air. With two cows, three hogs and a horse, I estimate that I make, between the first of April and December, forty cart-loads of good manure; worth one dollar per load, at a cost which I think does not exceed fifty cents per load. I make no account, however, of the muck, except the expense of digging it in the autumn, and sledding it home in the winter, for the reason that, by cutting wide and deep ditches, through the principal springs, I have, within four years, drained nearly two acres of swamp land, that were formerly covered with water, and now are sufficiently dry for the plough.

SUNDERLAND, 1856.

Statement of Alfred Montague.

GUANO.—I wish to call attention to a few careful experiments, made the past season. The first tends to prove the value of guano, as compared with the first quality of hog manure, on cold land in corn. On such land, I ploughed in a fair coat of manure from the yard, then furrowed it, having previously made it fine by the use of the harrow and bush. On one-half of this piece, I put hog manure in the furrow, at the rate of twelve loads to the acre. On the other half, I put 150 lbs. of guano to

the acre. The cost of the manure applied to the land, was fifteen dollars, and of the guano, five dollars, making a difference of ten dollars per acre. As near as I can judge, at the present time, there are ten bushels more of corn on the half that was guanoed, than on the other half. There is certainly a much heavier growth of stalks, but as it is not yet husked, I cannot state the exact difference.

Having a piece of sandy plain, too poor to produce any thing but a light crop of rye once in three or four years, I thought I would raise a crop of corn on it. Accordingly I ploughed in 300 lbs. of guano on an acre, and fallowed it. I gave it a light harrowing, planted, hoed it twice, at a cost of eleven dollars, besides the ploughing, which I should have done if I had not planted it. I have husked nearly the whole of it, and I think I can safely calculate on twenty-five bushels of good sound corn —making a net profit of $14, or 130 per cent. The profit on this acre would purchase two acres of such land at the present market value. I also harrowed in, a year since, at the rate of 100 lbs. of guano to the acre, at the time of sowing rye, and it increased my crop seven bushels. These and other trials have fully satisfied me, that while we can procure guano for three cents a pound, we may be confident, that if properly used, a fair annual investment in it will return a good income, whether applied to warm or cold lands.

SUNDERLAND, 1856.

Statement of Theodore G. Huntington.

The piece of ground on which my experiment was made, is a cold, dry loam. In the summer of 1854, it was in grass, and probably did not produce 500 pounds of good hay per acre. In the spring of 1855, it was ploughed, and manured at the rate of twenty loads per acre of composted manure, consisting of muck, ashes, plaster and saltpetre, which cost, on the ground, one dollar per load. I planted to Carter potatoes, and obtained a small yield of forty bushels per acre, but of good quality.

Last spring, the ground, after being ploughed, was dressed with 200 lbs. of guano per acre, a small piece on the poorest part of the lot being left undressed for the purpose of noting the

difference. The piece was then sowed to oats and grass seed. In harvesting, I measured off one rod square of the unmanured ground and a like quantity of the manured, the two being within a few feet of each other. The two pieces were reaped, taken home and put into the barn. The result was as follows:—

The rod dressed with guano yielded 12 quarts of oats, weighing 10 lbs., straw $10\frac{1}{4}$ lbs. This per acre would be—

$53\frac{1}{2}$ bushels, at 50 cents, . . .	$26 75	
1,040 lbs. straw, at $8, ...	6 56	
		$33 31

The undressed rod yielded 8 quarts of oats, $5\frac{6}{16}$ lbs., making per acre—

29 bush., 30 lbs. per bush., 50 cts. per bush., ...	$14 50	
820 lbs. straw, at $8, ...	3 28	
		$17 78
Difference in favor of guano—		
Per acre, ...		$15 53
Deduct cost of 200 lbs. guano, . . .		6 00
Net profit per acre, . . .		$9 53

It will be noticed in this experiment, that the oats not only yielded much more, but were of much better quality, where the guano was used. As far as my observation goes, this manure, when applied to cold land, produces a much more striking effect upon a crop of oats, than upon one of corn.

North Hadley, 1856.

Statement of Kelita Hubbard.

Turning in Green Crops.—I have practised, for several years, turning in rye for manure. My land has nearly doubled in value. I can raise two bushels of potatoes, corn or rye, where I could raise but one a few years ago. I plough my land as soon as convenient after harvest, when my cattle have little to do. The feed in the fall pays for ploughing and seed. I turn in the rye crop in the spring, and think it is equal to five loads of manure to the acre. This operation destroys the weeds, pulverizes the soil, and saves much labor in the cultivation of the next crop.

Sunderland, 1856.

PLYMOUTH.

Statement of Jonathan Copeland.

Having entered as a competitor for the premium on compost manure, I give the following statement :—

Having a barn cellar, forty by thirty-six feet, with a yard adjoining, I cover the cellar and yard with swamp mud and loam in the fall. I keep from ten to fourteen head of cattle. My cows, one yoke of oxen, and horses, have been kept in the barn nights, all the year; and the manure made by them goes into the cellar, where I have kept from four to six shoats, which work over and mix the manure in the winter. I have a sty, which I fill with loam, muck, ashes, weeds, potato tops, &c., as occasion requires, and keep two hogs in it. I have made and carted out, the past year, 335 loads, and judge that I have 50 or 60 loads more to get out.

I have got out 150 loads of meadow muck for the purpose of composting.

Statement of Austin J. Roberts.

It is of little use for me to compete with farmers in the quantity of compost manure. My aim is not quantity, but quality. Probably a less quantity of compost, for the number of stock kept, (three horses and ten head of cattle, besides pigs,) is not made by any practical farmer in the county. The chief concern of some of our agriulturists appears to be, who shall manufacture the greatest quantity of manure, without due regard to the quality of the article. This depends, in a great measure, on the mode of feeding cattle. Substantial feeding will give a corresponding value to the excrements of animals. Oil meal, fed to stock, enhances the value of the dung fourfold, and enriches a far greater proportion of soil than would be the case in common feeding.

I observe strictly, the following rule in my management of the compost heap: The cattle are housed in summer and winter, not yarded, as is the general plan, during the summer. Their excrements fall into the cellar beneath the barn, are worked over and mixed, by pigs, with about twice the quantity of pul-

verized muck. Soapsuds, and other slops, are, from time to time, poured upon the mass. In the spring, the whole is dug over, and carted where it is wanted. For manurial purposes, no use is made of the barnyard. The heat, droughts, and drenching rain storms, forbid its use.

I have made, the present year, 235 loads of compost manure of excellent quality.

Statement of Nahum Snell.

Being a competitor for the society's premium on compost manure, I will state the manner in which I have managed my compost heap: In the first place, I carted about fifty loads of good swamp muck into my barnyard, with litter from the barn. My cattle are kept in the yard during the pleasant weather in winter. I have a barn cellar, in which I keep from four to twenty shoats during the year. I have four horses and eight or ten cattle, which I keep in the barn nights, summer and winter, whose droppings are deposited in the barn cellar, with muck and loam; also the contents of five vaults, sink-drains, and other refuse materials, which I mix with slacked lime, ashes, and loam, all of which are mixed with my barnyard manure, making a good compost for corn or grass. I have made and carted out, the past year, 307 loads.

INDIAN CORN.

MIDDLESEX NORTH.

From the Report of the Committee.

Four competitors for the society's premiums on corn, have entered their claims in accordance with the rules of the society. We think there were many other fields of corn, within the limits of the society, that yielded as much, and some, probably more, than those entered; but many farmers hesitate to compete for the premium, thinking it impracticable to grow seventy bushels

of corn on an acre in this cold climate ; but in this we hope to dissipate all doubts.

Your committee take the liberty to express the opinion that Indian corn is the most important crop in this region. We have often heard it remarked, that the hay crop is the most important crop in this vicinity ; now, when we take into consideration that the husks and stalks on an average acre of corn, are as valuable as an average acre of grass or hay, for food for neat stock, which, we believe, is conceded on all hands ; and, taking into consideration that the cultivated grasses will succeed better after the corn crop than after any other cultivated crop, and that there is more nutriment in corn than in any other cultivated crop, we come to the conclusion that Indian corn takes the lead of all cultivated crops in this vicinity.

Agricultural societies will award as large a premium on one animal as on an acre of corn, when it is the corn that produces that symmetry and outward sleekness of the animal that renders it worthy of a premium ; for there are properties in Indian corn that give nourishment to every part of the animal system—bone, sinew, muscle, and nerve to the brain, and even to the hair.

Your committee have thoroughly examined every claimant's field of corn, measured off one average rod of the half acre, and saw the corn harvested, shelled, and measured as accurately as though buying or selling, and at a time when the corn was dry enough to crib or grind.

How much corn will shrink, between the harvesting and the next seed time, it is not given us to decide. For ourselves, we believe the shrinkage is greater than is generally supposed.

Your committee have awarded premiums to those gentlemen whose statement are appended to this report.

ALPHEUS SPAULDING, *Chairman.*

CHELMSFORD, November 15, 1856.

Statement of Lewis H. Hildreth.

The half acre of corn which I offer for premium, was planted the 4th day of June, on land which was in carrots last year. October 1st, I gathered one square rod, in presence of one of

your committee, husked and put it in a room where we almost constantly keep a fire, till November 8th, when I shelled it, and had eighteen quarts of corn, making ninety bushels to the acre. I manured the land last year for carrots, at the rate of thirty-five cart-loads to the acre. This year it was planted to corn without any manure, except 300 lbs. of super-phosphate of lime to the acre, applied in the hill at the time of planting. The expenses of the crop are given below:—

Ploughing,	$1 50
Furrowing, seed and planting,	2 50
Hoeing, three times,	4 00
150 lbs. super-phosphate of lime,	4 50
Total,	$12 50

Yield—Ninety bushels to the acre.

Statement of Sewall Parkhurst.

The half acre of land on which my corn was raised is a loamy soil. In the spring of 1855, I spread on the grass twenty-five cart-loads of manure from my barn cellar, to the acre, and ploughed it in four inches deep, and planted with corn. This year, before planting, I spread twenty cart-loads to the acre; ploughed and harrowed the ground twice. Planted the Porter and Brown corn mixed, with a corn-planter. Expenses on the half acre:—

Carting and spreading manure,	$2 00
Ploughing and harrowing, twice,	3 00
Marking the ground and planting,	75
Cultivating, twice,	75
Hoeing, twice,	2 00
Value of half manure,	5 00
Seed corn,	25
Total,	$13 75

Yield—Seventy-eight bushels, three pecks to the acre.

CHELMSFORD.

Statement of William F. Cheney.

The land on which my corn was raised is meadow, and in potatoes last year. The half acre was ploughed once, furrowed, and laid out four cart-loads of manure in the hill, planted it, and hoed it once. Expenses of cultivation:—

Drawing and laying out manure in hill,	$1 00
Ploughing and furrowing,	1 75
Planting,	1 20
Hoeing,	1 58
Four cart-loads manure, half to corn,	2 00
Seed corn,	17
Total,	$7 70

Yield—Seventy-four bushels, twelve quarts to the acre.

TYNGSBOROUGH.

Statement of Francis Richardson.

The half acre of corn which I offer for premium, is a sandy loam. It was in grass last year. This year it was ploughed in May, six inches deep; manured from the barn cellar, 8⅔ loads, two-thirds meadow muck, spread and harrowed in, marked with a chain each way three feet apart, planted with Brown corn. First time hoeing cultivated both ways, and hoed twice afterwards. Expenses of the crop as follows:—

Manure in cellar, 8⅔ loads, $8.67—half to corn,	$4 33
Ploughing,	1 25
Carting and spreading manure,	1 75
Harrowing,	50
Marking and planting,	75
Cultivating and hoeing, three times,	2 00
Total,	$10 58

Yield—Seventy-one bushels one peck to the acre.

CHELMSFORD.

WORCESTER NORTH.

From the Report of the Committee.

In the rules of the trustees offering the premiums on the several kinds of grain, including white beans and cabbages, it reads, "For the most profitable crop;" and with grain it must weigh a certain amount to the rod or bushel, to entitle the owner to a premium. For the best acre of corn, any variety, the product to be not less than 30 lbs. to the square rod at harvesting.

Though your committee were at no trouble in finding the cornfields, yet not so with the statements in regard to the cultivation and expense of the crop; and it is hoped that next year, the trustees will adopt a different course from the one pursued this year.*

ISAAC B. WOODWARD, *Chairman.*

Statement of John Brooks, Jr.

The field of corn entered by me for a premium, was measured, and contains one acre and twenty-four rods. It inclines to the west; and it is fifteen years since it was ploughed. Soil, clayey loam. About the middle of May, fifteen loads of manure, (one-third swamp muck,) were spread and ploughed in with a double, side-hill plough.

About the first of June, 250 lbs. of guano were sown and harrowed in. Furrowed one way; 50 lbs. guano mixed with 25 bushels muck, put in the hill, one large handful, each. The

* The subject here alluded to is one that has always been a "stumbling block" in the way of gaining information concerning premium crops. It is frequently with difficulty that statements can be procured at all, and often their contents are valueless to the society when obtained.

In order to remedy this difficulty, the society, at its annual meeting, December 3d, 1856, adopted a form, containing questions to be answered by competitors, and, unless these are all properly answered and returned to the secretary, within a specified time, the crop will be considered as having been withdrawn, and cannot be entitled to a premium. This mode, it is hoped, will insure promptness, and entire uniformity in all future statements.—*Secretary of the Society.*

furrows were three and one-half feet apart; hills in the furrows three feet. Planted with King Phillip corn, six kernels in a hill.

Expenses:—	
Interest on land,	$3 00
Taxes,	30
15 loads manure,	15 00
250 lbs. guano, broadcast,	7 50
50 lbs. guano, in the hill,	1 50
Breaking up, 1½ days,	5 25
Harrowing,	1 50
Furrowing out,	50
Planting,	3 00
Seed corn,	50
Ploughing and hoeing, twice,	10 00
Cutting and binding stalks,	1 50
	$49 55
Deduct one-half manure, unexhausted,	12 00
	$37 55

I allow the value of the stalks and buts to offset the expense of harvesting and husking.

Statement of Solon Carter.

The field of corn I offer for the society's premium, was cultivated as follows:—

The field had been in grass for seven years. It was ploughed in August, directly after the hay crop was removed. Late in November I spread about twelve loads of manure to the acre, from the barn-cellar, and cross-ploughed it. In April it was harrowed to check the grass and weeds. May 6th, I carted fifteen loads of manure to the acre, which was spread and ploughed in the two following days. The next day it began to rain, and continued, almost without intermission, for three days. This left the ground so hard, I thought it best to plough again, which I did before planting, (thus making four ploughings.) It was then bushed to smooth the top of the furrows, marked three and one-half feet each way, with a machine marking two rows at a time, (the third following the last row.) It was then

planted, with Randall & Jones's double corn-planter, on the 19th of May. At the first hoeing I went through the field both ways, with a light, sharp harrow, of nine teeth. Immediately after this hoeing, I went through one way with the horse-hoe—and with the corn-planter, planted beans midway between the hills. When the beans were up, I went through again with the horse-hoe, following with the hand-hoe. After haying, I went through the field again with the horse-hoe, thus destroying all weeds, and leaving the surface light and level.

Expense of cultivating:—

First ploughing,	$5 00
12 loads of manure,	24 00
Second ploughing,	2 50
15 loads of manure,	30 00
Third ploughing,	2 50
Fourth ploughing,	2 50
Seed, 37 cts., marking and planting, 75 cts.,	1 12
First hoeing,	2 50
Second hoeing,	3 50
Third hoeing,	2 00
(One-half, at least, of the last two hoeings should be charged to the beans.)	
Cutting and securing stalks,	2 00
Harvesting corn,	8 00
	$85 62

You can tell what I raised, and perhaps the benefit the labor and manure will be to the after crops.

There is a difference of opinion and practice among our farmers as to the best way of securing the corn crop. Some hold to the old way of cutting stalks; some think it better to cut at the root and stook, and others think that all should stand still till it is fit to harvest.

I am trying a hundred hills in each of the above ways, and if desired, can give you, at some future time, the result of the trial.*

*Mr. Carter, under date of December 20th, gives the result as follows:—

Each of the three lots contained four rows, of twenty-four hills each; in all, ninety-six hills. Lot No. 1 was cut at the ground, and stooked, September

HAMPSHIRE, FRANKLIN, AND HAMPDEN.

Statement of Moses Stebbins.

I have had the misfortune of having my cattle break into my cornfield which I entered for the premium ($25 per 100 bushels on the acre) of your society. In consequence of this, I have not complied with the rules of the society in relation to it; but transmit to you a statement of the culture and produce of another lot of four acres of corn, raised the past season, a part of which was not harvested when my cattle broke into the best field. The field had been in grass eight years, without manure. In the spring of 1854, I hauled on and spread 25 loads of long manure with 200 lbs. of plaster to the acre, and ploughed ten inches deep with Ruggles, Nourse & Mason's double swivel plough. I then spread 10 loads of light compost, (earth drawn into my yard to absorb the liquid manure,) on the furrow, and harrowed well, and planted to corn. Product estimated, at 100 bushels of merchantable corn to the acre.

24th. Lot No. 2 had the top stalks cut in the usual way, at the same date. Lot No. 3 was left standing whole until October 29th, when each of the lots was harvested and husked. The ears were then spread about six inches deep, and remained until December 20th. At this date the whole was shelled, and the result is as follows:—

	Lot No. 1. Cut up whole, and stooked. Sept. 24.	Lot No. 2. Top stalks cut Sept. 24.	Lot No. 3. Left standing whole.
October 29.—Harvested. Weight, .	143 lbs.	155½ lbs.	154 lbs.
December 20.—Shelled. Corn weighed	111 lbs.	131 lbs.	125 lbs.
Cobs weighed, ...	16 lbs.	18 lbs.	17½ lbs.
Total, ...	127 lbs.	149 lbs.	142½ lbs.
Shrinkage, ...	16 lbs.	6½ lbs.	11½ lbs.
Per cent. of shrinkage, ...	13 lbs.	4 lbs.	8 lbs.

It appears by this experiment, that the corn which was stooked weighed *least* at harvesting, and *shrunk most* before shelling, while that which had the top stalks cut, weighed *most* at harvesting, and *shrunk least* before shelling.—*Secretary of the Society.*

In the spring of 1856, I hauled on 20 loads of long manure, and spread and ploughed as above with plaster, and harrowed without the top-dressing, and planted about the 20th of May, with Billings's planter. The seed proved defective, and I planted the second time, to the injury of the crop. I hoed three times, the third was simply going over the field and cutting the weeds, leaving the ground as level as possible. In September, I cut and stacked my corn, putting in each what equalled a corn basket of ears to a stack. About the 15th of October, I commenced harvesting, and after picking more than half the field, and some of the heaviest corn in it, I measured off one acre at the north-east corner, having the shade of one large hickory and one apple tree, which acre contained 148 stacks, from which we picked 82 baskets of husked corn. I have now filled the basket out of my crib, the weight of which was 92 lbs. The yield of shelled corn was 77 lbs., which gives $112\frac{42}{56}$ bushels. Had I selected the acre out of the shade, I should have increased the quantity. For reasons given, I did not think of taking the measure of an acre in the field, till it was too late to lay off one acre of the best corn.

The farmers here say that my farming don't pay! Let us estimate the expense of that acre of corn:—

Manure and plaster, carting and spreading,	$25 00	
Ploughing, harrowing, planting and hoeing,	9 00	
Harvesting,	6 00	
Interest on land,	6 00	
Cost of crop,		$46 00
100 bushels corn, at 90 cts.,	90 00	
2 tons fodder, at $6 per ton,	12 00	
Improvevent of land,	10 00	
		118 00
Profit,		$66 00

By the above statement, you will see my mode of farming for fifteen years. I plant my ground two years in succession, then sow to wheat or barley and stock down to grass and mow from four to eight years. During the fifteen years which I have practised the present mode of farming, I have more than trebled the produce of my farm.

South Deerfield, 1856.

HAMPSHIRE.

From the Report of the Committee.

The Hampshire Agricultural Society offers premiums for the best crops—not to encourage farmers to raise great crops, regardless of expense, on their best lands, but rather with economy, to raise the best and largest crops, at a reasonable cost of land, labor and manure. No premium is offered for crops raised on new lands which contain, usually, all the elements for large crops. This agricultural association offers premiums on crops, with reference the value and condition of the land; the mode of husbandry; the time of ploughing; the depth and the number of times; the kind and cost of manures, and how and when applied; time of planting and sowing, variety of seed used, mode of culture, when and how harvested, the whole cost, and value of the crop, and requires a full and faithful statement from each competitor. A medium crop, grown on not the best soil, by economical and skilful husbandry, may justly obtain a higher premium, than a very large crop, raised on the same, or on very valuable land, at a great cost of labor, foreign manures, &c. Some lands are so rich, and so well adapted to particular crops, that neither skill, nor manure, and but a moderate amount of labor, is needed to make them bring forth abundantly. No premiums should be awarded, where Nature does all the work, and throws up from her own bosom a spontaneous and abundant growth.

What benefits will the farmer derive, by thus endeavoring to raise large crops? In the first place, if successful, he will most certainly be the possessor of the large crop itself, and may secure a premium from some agricultural society, by conforming to its rules and requirements. Again, he will have all the benefit of his experience and experiments, in selecting, preparing, manuring and planting; also, in seeding and harvesting. He will learn how to adapt the crop to the particular piece of land most fit for it;—how to prepare with the least expense the most valuable and fertilizing manures. He will find that home made manures may be more economical than the imported. He will learn what kind of manure each crop requires, and when and

how to apply. His inventive genius may bring to his aid new labor-saving machines. He will learn to do every thing in the right time and in the right manner. Method and economy should be his watchwords. Not entirely contented with his own experience and experiments, he will strive to learn from his neighbors', agricultural papers and books. In a word, his endeavor to raise large crops tends to make the farmer a student, chemist and philosopher; a learner from the great book of Nature, and a shareholder in her *bank stock*—the surest and most reliable in the world!

The competition for the Hampshire Society's premium on crops, was greater this, than in any former year. The whole number of crops entered was forty, viz.: two of carrots, two of turnips, three of potatoes, four of oats, four of rye, seven of wheat, seven of Indian corn, and eleven of broomcorn. The statements of the successful competitors are annexed.

DANIEL RICE, *Chairman.*

Statement of Albert Montague.

The acre of land on which my corn grew, is a sandy loam. It was in broomcorn last year, when it received a light coat of manure on the surface. The broomcorn was light, not more than six or seven hundred pounds to the acre. On the 27th of May, I carted fifteen loads of coarse manure from my yard, and ploughed it in. I ploughed seven inches deep, and the next day I harrowed it fine, furrowed it with a small plough, and in the furrows spread 150 lbs. of guano, and planted with Woodward's planter. My hills were three feet apart from centre to centre, and the rows about three feet. I think there was no hill missing on the acre. Some kernels of corn, which were left a little distance from the main hill, produced five ears of corn, viz.: three on the seed stalk, and two on the suckers. I hoed three times, but the last time I did not use a horse, as the corn was too large to allow it. I cut it the 24th of September, carted and husked it the last of October. It was very dry when husked. I counted the baskets, and, by shelling one of them, I found $93\frac{1}{4}$ bushels of shelled corn, weighing 56 lbs. to the bushel, and just about the same by measurement. I weighed one stack of fodder, and by multiplication, I learn there were

7,200 lbs. I give the statement of expenses as near as I can. I charge only three-fourths of the yard manure to the corn crop, as I believe it has not taken more than that.

Value of crop:—		
93¼ bushels of corn, $1,	$93 25	
7,200 lbs of corn fodder, $6,	21 60	
7 bushels of soft corn, 25 cts.,	1 75	
	——	$116 60
Expenses:—		
Manure on the field,	$13 50	
Guano,	4 50	
Ploughing, harrowing and planting,	3 00	
Hoeing, three times,	4 00	
Harvesting,	8 00	
Interest on land,	4 00	
	——	$37 00
Net profit,		$79 60

SUNDERLAND, November 10, 1856.

Statement of John M. Smith.

My corn was raised on land which may be called clayey loam, and measures five acres, sixty-four rods. I had about three acres of it in grass for three years previous to 1855. In the spring of 1855, I ploughed in ten loads of manure to the acre, planted corn, and had a fair crop. In the spring of 1856, I put on twelve loads to the acre, and ploughed in. The remainder of the piece was in grass for three years previous to this season, and was manured in the same way, excepting one acre, which was cultivated as follows: One-half was ploughed in November, 1855, and the other half in the spring of 1856. Twenty loads of compost manure were spread on the whole acre and harrowed in. I could perceive no difference in the growth of the crop, in consequence of the two modes of ploughing. There was no trouble from worms. I ploughed seven inches deep, and planted with Woodward's planter, between the 15th and 25th of May, and put in eight bushels of ashes to the acre. The corn is the "twelve-rowed Dutton variety." The stalks stood three feet

four inches apart each way. The yield was at the rate of 83⅓ bushels to the acre, and the net profit $62.50.

Value of crop:—		
450 bushels of sound corn, at $1, . . .	$450 00	
15 tons fodder, $90; 8 bush. soft corn, $2,	92 00	
		$542 00
Expenses:—		
Manure, $80; applying it, $12.50; seed, $1.50; planting, $3, ...	$97 00	
Ploughing and harrowing, $10; hoeing, $12.50; harvesting, $40; interest and taxes, $45, .	107 50	
		$204 50
Net profit on 5⅔ acres, . .		$337 50

SUNDERLAND, November 15, 1856.

FRANKLIN.

Statement of Ebenezer Bardwell.

The crop of corn offered for premium was raised on land which lies with a gentle slope toward the east. The piece contains two acres and seven rods, and had been down to grass for two or three years previous to the spring of 1856, with no manure at all. The product of grass in 1855 was over two tons, per acre. In the spring of 1856, hauled fifty loads of long manure, spread it evenly over the ground, took one of Ruggles, Nourse & Mason's side-hill ploughs and turned it under, ploughing about eight inches deep, harrowed enough to make it light and mellow, then took one of Billings's improved planters on the 23d day of May, and planted it, putting the rows three feet apart, and hills forty-four inches; hoed three times; harvested in October 218½ bushels of sound corn, and 6 of soft, making the yield in all 224½ bushels of shelled corn.

Value of crop:—		
218½ bushels corn at 85c. per bushel, . .	$186 39	
Corn fodder, ...	15 00	
		$201 39

Expenses:—		
Value of manure,	$62 50	
Hauling and spreading manure,	10 00	
Ploughing and harrowing,	8 00	
Planting and hoeing,	12 00	
Cutting and harvesting,	30 00	
Interest on land,	12 00	
		$134 50
Balance in favor of crop,		$66 89

SHELBURNE, November 1, 1856.

Statement of Franklin Arms.

Having followed the directions of the society, I give you the summing up of the acre of corn entered for premium. Six years previous to 1853 it was in grass and mowed, producing not over half a ton of hay. After it was mowed I ploughed it, and put on rye. The yield was light—but little more than seed. In 1855, one-fourth of an acre was sown to oats, and three-fourths planted to potatoes, with a top-dressing of five loads of compost spread on the furrow and harrowed in. The yield of potatoes and oats was fair.

In 1856, it was manured with twenty common cart loads from the sheep and barnyard, spread and ploughed under deep, top-dressed again with ten loads of compost, and harrowed thoroughly. Planted May 19th, with a variety called the leaf corn, three feet each way, put from five to seven in a hill, and thinned to four at the second hoeing; hoed it three times, as follows: June 10th, 20th, and July 8th.

Cut the top stalks September 13, and harvested it about the 20th of October.

The amount of produce was ascertained by measuring the ears as husked. One basket spread and thoroughly dried, shelled, and found to contain 30 quarts and 1 pint, which, multiplied by 104 baskets, the amount produced on the acre, was 99 bushels, 4 quarts and 1 pint.

Expenses:—	
To 30 loads of manure,	$30 00
Drawing and spreading,	6 00

To Ploughing,	$2 00	
Harrowing,	75	
Planting,	1 00	
Seed,	37	
Cultivating and hoeing, three times,	6 00	
Topping and stacking stalks,	1 00	
Harvesting,	5 00	
Interest on land, at $50 per acre,	3 00	
Total,		$55 12
Value of crop:—		
By 99 bushels 4½ quarts, at 87½ cts.,	$86 75	
180 bundles top stalks,	2 60	
2 loads bottom stalks,	2 00	
400 lbs husks sold,	2 40	
⅓ value manure not expended,	10 00	
		$103 75
Expenses,		55 12
Profit,		$48 63

Note.—I would add that about half of the acre suffered very much from the drought, which diminished the crop considerably.

Conway, November 5, 1856.

PLYMOUTH.

Statement of Samuel W. Bates.

The acre of land which I enter for the society's premium on Indian corn, is a stony soil; it was planted with potatoes last year, without manure. The first of May last, carted from my barn cellar, five cords manure, spread it and ploughed it in, about six inches deep, then waited about ten days for the ground to be dry, which was very wet. After which I spread 100 bushels leached ashes, and 150 lbs. guano, and three cords compost manure, from hog-yard, and harrowed once. Furrowed one way, six rows to the rod. Planted the 23d of May, with the Whitman corn, about twenty inches apart, three corns in a hill. Seed sowed at harvest time.

Expenses:—	
Drawing 8 cords manure and spreading,	$5 00
Ploughing and harrowing,	2 00
Planting and furrowing,	2 00
Cultivating and hoeing,	5 00
Seed corn,	50
	$14 50

I have not charged the manure in the expense of raising the corn. Quantity raised on the acre, as reported by the supervisor, $113\frac{35}{85}$ bushels.

Statement of Spencer Leonard, Jr.

Having entered as a competitor for the premium offered for the greatest crop of Indian corn on an acre, I will give an account thereof. The ground had been mowed for several years, and came into my possession in 1855, producing that year, about 1,500 lbs. of hay. About the middle of May, I took nine cords of good manure from under my stable, spread it on the sward, and ploughed under, to the depth of seven or eight inches; it was then well harrowed, and marked for planting, three feet four inches one way, and half that distance the other, marking three rows at a time. The corn was planted the 20th day of May, without any manure in the hill, with the exception of twelve rows, in which a handful of poudrette was put in each hill.

From some unknown cause, the corn did not come up well; the portion where the poudrette was applied took a vigorous start, and six weeks from the time of planting, it was probably more than twice as heavy as the other; and to persons who wish to put something in the hill, to give the corn a start, I would recommend poudrette as the best thing for that purpose that I am acquainted with. At the time of harvesting, it would have been difficult for good judges to tell which part was the heaviest.

The ground was cultivated four times, hoed twice, and kept clear of weeds; what few weeds escaped the hoe and cultivator were pulled up in August. The stalks were cut about the time they began to turn.

The corn planted was the "smutty white," or "Hill corn," and was selected at the harvesting of my last year's crop.

Expenses:—	
Nine cords manure,	$36 00
Carting and spreading,	5 75
Ploughing,	3 00
Harrowing and marking,	1 25
Planting,	2 50
Hoeing, cultivating, and pulling weeds,	7 00
Cutting stalks,	2 25
Harvesting,	7 00
Poudrette,	1 50
Seed corn,	75
Interest on land,	4 50
	$71 50
Income:—	
100 bushels corn, as measured by the committee, Oct. 15th, at 92 cts.,	$92 00
2½ tons of corn fodder, at $8 per ton,	20 00
One-half the manure, unexhausted,	18 00
Total income,	$130 00
Total expense,	71 50
Profit,	$58 50

NORFOLK.

From the Report of the Committee.

The committee on grain crops report that there have been five applications made for premium on corn, four on rye, and one on barley. Three of corn and one of rye were subsequently withdrawn. The crop of barley and one crop of rye entered, having been raised on less than one acre, each, their claims for premiums could not be considered. Many pieces of corn failed to come up well, and considerable damage was done to the crop by the winds in August. But notwithstanding these drawbacks, we believe the corn crop to have been above the average of preceding years. The large quantity of snow, and its long contin-

uance the past winter, left the rye crop in fine condition in the spring, and the weather continuing favorable, we have had many fine fields of that grain.

A field of corn, entered by Mr. Brown, in Milton, looked remarkably promising, but was prostrated by the wind, and so badly injured that it was withdrawn. The yield, however, was about seventy-six bushels per acre, by measurement. Two pieces of corn, planted on reclaimed swamp, one in Milton and one in Quincy, appeared uncommonly well. But the committee received no account of them.

Mr. P. Ruggles, of Milton, was unfortunate, his corn not coming up well. His corn, though very thin, yielded at the rate of eighty-four bushels per acre.

A field of rye, offered by Mr. C. L. Cunningham, of Milton, was withdrawn. It ought to be stated, that this field was sown with the intention of cutting green for soiling cattle, but having been highly manured, it lodged so as to injure the grain. This field yielded at the rate of thirty-nine and a quarter bushels of grain and 5,136 pounds of straw per acre.

The statement of Mr. Fenno is annexed. We regret that the quantity of land in his field was less than was required by the rules of the society, as otherwise a premium might have been awarded to him.

From the facts in the following statements, we learn that the raising of grain may be made profitable. From these statements, we learn that from 80 to 100 bushels of corn, and even more, have been raised to the acre, and that, too, in seasons and on soils deemed quite unfavorable. In view of these facts, the question arises, why may not such products be obtained by all our farmers. We can see no reason why, with similar treatment, similar results may not be obtained.

The statement of the Messrs. Sias demonstrate by experience, that more than 100 bushels of corn can be obtained per acre. This is not the result of accident, but of carefully conducted experiments, testing the capacity of the soil; and they assure us that they shall not remain satisfied until they have raised a greater crop than any yet obtained. If all our farmers who cultivate grain, would engage in carefully conducted experiments, with the same determination to test the capacity of their

soils, we should soon have a practical solution of the problem, whether grain can be profitably raised in this county.

The many failures attending the cultivation of wheat, have led to the supposition that it cannot be profitably raised in this part of the State; yet we have good evidence from many who have tried the experiment in different parts of the county, that from twenty to thirty-five bushels have been raised per acre. These results, exceeding the average crop in the best wheat growing States, are sufficient to induce our farmers to continue their experiments; and we hope that some definite results will yet be obtained, by which we may calculate with certainty upon a crop of wheat, as of other grains.

The statements on rye show what may be expected from this grain, when liberally treated. The usual method of sowing our poorest soils without manure, will not lead us to expect any very great returns; but, with liberal treatment, as good returns may be expected as from any other crop. We believe it to be the true economy of every farmer to raise all the grain necessary for consumption upon his farm. If this course does not bring money into the pocket, it certainly prevents a good deal from going out; and the farmer will have the satisfaction of having his bread made of the products of his own farm.

Many farmers are convinced, that corn and rye can be raised at a profit in Norfolk county, though all the manure be bought, and the labor hired. A gentleman of good judgment and great experience in farming, but who has hitherto been rather sceptical about raising 100 bushels to the acre, tells us that he thinks corn has been a slandered crop; that he is becoming convinced of its value; that although he had been sadly disappointed this year in his corn not coming up, he should continue to plant largely, satisfied as he is that it can be raised at a profit.

L. Clapp, *Chairman.*

Statement of E. and J. Sias.

The field of corn entered for a premium was measured and contained one acre. The committee measured and weighed the produce of one square rod. The land, which had been in grass for several years, was ploughed May 5th, with a common plough,

about seven inches deep. May 13th we spread on four cords of horse manure, and three and a half of compost horse manure. May 14th, harrowed lightly and cultivated both ways. From May 15th to 19th, planted with Plymouth county, or smutty white corn—after putting about two cords of compost manure, made from the hencoop and outhouses, mixed with loam—in hills, averaging three and a half feet apart. It was planted as last year, four making a square, with two near the centre; but from some unexplainable cause it came up very poorly, having upon an average only four to the hill. We cultivated the field three times and hoed twice. In many hills there were but one or two stalks, and consequently, as the ground was slightly manured, there was a large quantity of suckers, which were all cut, with the stalks, between September 8th and 17th. They were cut one day and got in the next, and set up on a neighbor's barn floor, where there was room to cure them. The corn was harvested (excepting the rod left for the committee to harvest) from October 7th to the 18th; and there was on the field $162\frac{1}{2}$ baskets of sound corn and six of refuse, equal, as thought, to $165\frac{1}{2}$ of good sound corn on the acre, one basket of which was laid by itself, to dry until November 10th, when it was shelled and weighed in the presence of one of the committee, and was found to be $37\frac{1}{2}$ pounds of corn, making, as calculated, 110.82 bushels per acre, being a fraction more than the rod which the committee harvested.

In order to arrive at the weight of the fodder, we cut the stalks and suckers from the two rows through the centre of the field, and after curing, kept them by themselves until weighed by the committee; also the weight of the buts and husks on two rows.

We observe that it is usual to deduct one-third of the value of manure as not taken up by the crop, which was done. We, however, are inclined to the opinion, that when there are 110 bushels of corn and five tons of fodder taken from an acre of land, but little, if any, deduction should be made for the manure left in the ground. We have, accordingly, in our estimate of expenses, added the whole cost of manure. We make our estimate as follows.

Value of crop:—

One acre of land, 110.82 bushels of corn, at $1 per bushel,	$110 82
One acre of land, 5,310 lbs. of stalks, at $12 per ton,	31 86
One acre of land, 4,792 lbs. of buts and husks, at $6 per ton,	14 37
	$157 05

Expenses:—

Interest on land, at $200 per acre,	$12 00
Taxes on land, about	1 35
Nine and a half cords of manure, at $6 per cord,	57 00
Ploughing,	4 00
Spreading manure, cultivating and harrowing,	5 00
Crossing out, manuring in hill, and planting,	7 00
One peck of seed,	50
Cultivating and hoeing twice,	9 00
Cutting and getting in stocks,	5 00
Harvesting,	7 00
Net profit, (after paying for the manure, $49.20,)	$157 05

per acre; or if, as is usual, we deduct one-third of the manure, there will be a net profit of $68.20 per acre.

You will observe that we have made quite a deduction in weight from the buts and husks since you weighed them. Then they were somewhat moist, but have since been drying on rails over the barn floor. The husks when perfectly dry, weigh 53¼, instead of 68 lbs. to the row, making, as stated, 4,792 lbs. per acre.

The way we manage our corn fodder, drying the top stalks under cover and salting down the buts and husks, we are confident, from past experience, makes them worth more to us than we have estimated them.

Milton, November 14, 1856.

Statement of A. L. Smith.

The acre of ground producing the corn offered for premium, was in grass the last fourteen years. The soil is a gravelly loam, and was ploughed last November, with a Michigan double plough, ten inches deep. The second week of May I spread and ploughed in, four inches deep, four cords of compost manure, made of ditch mud, bottoms of coal pits, loam, and the droppings of cattle. The field was furrowed one way, three feet apart, and manured in the hill with three cords of compost manure, then planted the 21st and 22d of May, in hills two and a half feet apart, with a kind of corn obtained from Rhode Island, called the "Andrews corn." This variety has been improving for the last six years; the original was a large cap yellow, the small Canada yellow, and a red cap corn; the object in planting the large yellow was to increase the size of the ears, the Canada to make it ripen earlier, and the red to increase the number of ears on a stalk, all of which has been satisfactorily accomplished. The corn was ploughed and hoed twice. The stalks were cut the 12th of September.

The 24th of October, a rod, considered a fair average of the piece, was harvested, and the result as follows:—

The corn on the cob weighed	$35\frac{3}{4}$ pounds.
Shelled corn, $30\frac{1}{4}$ pounds, Cobs, $5\frac{1}{2}$ "	$35\frac{3}{4}$ "

Husks and buts 25 lbs., allowing 2 lbs. on each rod for drying. Stalks, 9 lbs. per rod. Making 8,642 lbs. of corn per acre; buts and husks, 4,000 lbs. per acre; stalks, 1,440 lbs. per acre.

The expense of the crop was as follows:—

Ploughing, ...	$4 00
Spreading manure, ...	2 00
Ploughing in manure, ...	1 75
Furrowing, manuring in the hill, and planting, . .	5 00
Ploughing among corn and hoeing, ...	5 00
Cutting stalks and harvesting, ...	8 00
One-half manure, at $4 per cord, ...	14 00

Seed corn,	$0 50
Interest on land and taxes,	5 00
	$45 25

The value of the crop is as follows:—

86.42 bushels of corn, at $1,	$86 42
2 tons of husks, at $8 per ton,	16 00
Stalks,	8 50
	$110 92
Deducting cost of crop,	45 25
Leaves a net profit of	$65 67

Dover, October 25, 1856.

Statement of Charles Breck.

In order to test the value of Plymouth county or Webster corn, in other localities, I sent some of it last winter to Judge Marcy, of Royalton, Vt., who had seen it growing in this vicinity, and received of him the following account: "I planted all you sent me but two or three ears, (which I reserved to compare with my product,) on the 1st day of May, in hills three feet apart each way, the land being sufficiently dry, and manured with common barnyard manure, ploughed in. This was about twenty days earlier than corn is usually planted here. I planted a part of it on White River meadow lands, and the rest about a mile back. It came up well, and grew very rapidly till September, when there was a greater growth of it, than I ever saw of any other kind of corn raised here; but it was not so forward as other kinds, and I thought from appearance it would not get ripe, and, consequently, picked and used a good deal of it while green, for the table. But as the frost held off later than usual, (until the 20th of October,) that part which was planted on the river lands ripened perfectly, every ear being sound, and well filled, and as fine corn as I ever saw, and makes excellent meal. The ears are longer and larger round, and the kernels much longer and larger than those sent me. It will be seen, from the circumstances named, that I cannot ascertain the quantity produced per acre. I think, that on the meadow land the yield

would have been 100 bushels per acre. I picked from some hills which had remained entire, till ripe, eight large, sound and well filled ears. There was an equally large growth of that raised on the hill land, though I doubt the expediency of planting this corn on hill land in this State. Yet I think that, in common seasons, it might be profitably raised on the White River meadows and other favorable locations for corn; for though it might not all get quite ripe, yet I think enough would, to more than equal the average crop of the other varieties of corn usually raised in this State."

The committee are aware that most of the corn which was planted in this vicinity came up very poorly, many losing their entire crops, and others having to replant. The corn sent to Vermont I obtained of Mr. Ruggles, who is famous for raising large crops of it. His came up so badly this year, that he gave up all thought of a premium crop. Judge Marcy states that he believed every kernel which he planted came up, although planted nearly two weeks earlier than here. The corn I sent to Vermont was the basket of ears which Mr. Ruggles selected as the earliest and best in his field, intended for the exhibition at Dedham; while that planted by himself was taken from his bin, without any knowledge of its early or late ripening, or whether it was injured by the frost, which might have partially destroyed its vitality without being perceptible before planting. Now whether this be the cause of failure or not, farmers will lose nothing by taking a hint from suggestions, and may gain much.

MILTON, November 24, 1856.

WHEAT.

WORCESTER WEST.

From the Report of the Committee.

It certainly looks encouraging to see such statements as we have in regard to wheat crops. If wheat can be grown at this rate here, we cannot see or conceive of the need of going

west, or any where else, after material for our bread; this is double the average amount per acre, raised south or west, and is of a better quality. It is not quite as white, but a pound of the flour will make more bread than either the southern or western flour. It is hoped that after seeing what has been done, others will do likewise.

PETER HARWOOD, *Chairman.*

Statement of Edward P. Haynes.

The land on which my wheat was raised is a clayey loam; it was in potatoes last year, yielding 308 bushels of the large Woods potatoes, so called, without any manure, except a small handful of plaster in the hill. This spring, I put on twenty loads of compost made by stabling my cows nights, last fall; ploughed the land twice, ploughing in the manure the last time; sowed two bushels of red flint wheat, that had been soaked in a preparation of air slacked lime and salt, for twenty-four hours. It was sown April 25th, and harvested August 11th and 12th.

Expenses of crop:—	
Ploughing,	$ 2 00
Harrowing,	1 00
Sowing seed and rolling,	1 00
Half of manure to crop,	10 00
Seed,	6 00
Threshing,	3 62
Interest on land, at $50 per acre,	3 00
	$26 62
Value of crop:—	
29 bushels of wheat, at $2.50,	$72 50
Straw, estimated at	8 00
	$80 50
Deduct expense,	26 62
Balance in favor of crop,	$53 88

BARRE, September 15, 1856.

HAMPSHIRE.

Statement of William Bowman and Sons.

The land on which our wheat was raised, lies on the bank of the Connecticut River, and measures 148 rods. The soil is a sandy loam. We mowed a heavy crop of clover in June, 1855, and on the 5th of September, we ploughed in the second crop, which was good. On the next day, we sowed one-half bushel of wheat, and harrowed till the land was mellow as an ash heap. We sowed six bushels of plaster and ashes in the spring of '56, and though the growth of straw was not large, yet the heads were long and well filled with a large and plump berry.

Value of crop:—		
28½ bushels of wheat, at $2, ...	$57 00	
Straw, valued at	7 00	
		$64 00
Expenses:—		
Ploughing, sowing and harrowing, . . .	$3 00	
Seed $4, plaster, ashes and application, $1.50, .	5 50	
Harvesting and threshing, ...	6 00	
Interest on land, ...	5 00	
		19 50
Net profit, ...		$44 50

SUNDERLAND, November 15, 1856.

Statement of Theophilus P. Huntington.

The land on which my crop of spring wheat grew, lies near the bank of Connecticut River, and is more sandy than our alluvial soils generally are. In 1854, it was well manured and produced broomcorn. In 1855, no manure was used. About the middle of April, 1856, two bags of guano were sown, the principal part of it being ploughed in, and the remainder harrowed in with the seed. I cleansed as much as possible one and a half bushels of seed wheat, soaked it in strong lime, and afterwards by careful picking over, freed it from foul seed. The ground was harrowed and rolled. The crop was harvested

about the last of July, and threshed with flails the early part of September. The Scotch fife was the variety sown.

Value of crop:—		
24 bushels, 20 quarts,	$49 25	
¾ ton of straw, $6.50,	4 87	
		$54 12
Expenses:—		
Ploughing and sowing, $2, seed $3.75,	$5 75	
300 lbs. of guano, at $3.05 per cwt.,	9 15	
Harvesting $2, threshing $4.50,	6 50	
		21 40
Profit,		$32 72

Hadley, September 11, 1856.

FRANKLIN.

Statement of H. W. Cushman.

I claim a premium for an acre of winter wheat, and present the following statement respecting its cultivation:—

Last year, the land was cultivated with Indian corn, and produced a middling crop. The land is gravelly loam and rather dry. I put on last year about twenty loads of green manure from the barnyard, ploughed it in, and put ashes and plaster in the hill. After the corn was taken off I ploughed it twice, and sowed 1¾ bushels of white flint wheat the latter part of September. The wheat was soaked twelve hours in a weak brine, and rolled in plaster of Paris and ashes when sown. It was harrowed and rolled down with a roller.

The 25th of April, I sowed 100 lbs. of Peruvian guano on one half of the acre of wheat.

It was harvested the last of July. The product was 22⅓ bushels of clean wheat, weighing 60 lbs. to the bushel. The expenses of cultivation were as follows:—

Ploughing twice,	$3 00
Sowing, harrowing and rolling,	1 50
1¾ bushels seed,	5 68

100 lbs. guano,	$3 25	
Sowing guano,	50	
Harvesting,	2 50	
Threshing,	2 00	
Cost of cultivation,		$18 43
$22\frac{1}{3}$ bushels wheat, at $2.25,	$50 25	
$\frac{3}{4}$ ton straw, (estimated,) at $6,	4 50	
		$54 75
Gain,		$36 32

BERNARDSTON, September 30, 1856.

Statement of Charles Parsons.

The wheat offered for premium was raised on 180 rods of land. It was broken up in 1854. I harrowed in twenty cart-loads of stable manure and planted with corn. In 1855, I ploughed in twenty-five loads of sheep manure and put twelve loads of compost manure from the hogyard, in the hill, and planted corn. In 1856, the first week in May, I ploughed once, harrowed and sowed three bushels of wheat, after washing in brine and rolling in lime.

Produce, $41\frac{1}{4}$ bushels, averaging 36 bushels and 21 quarts per acre.

CONWAY, September 30, 1856.

PLYMOUTH.

Statement of Benjamin Hobart.

I ploughed my acre three times, but put on no manure this spring, for Mr. Allen says I err in manuring for wheat when sown in the spring. For three years past it was planted to corn, and well manured, and gave good crops. I sowed two bushels of my golden straw wheat on the acre, harrowed once before sowing and once after; sowed grass seed and bushed it. I reaped the wheat in the first part of August, and had seventeen bushels.

I committed two errors; I think I ought to have manured in the spring, and to have sown two and one-half bushels of

seed. In either case I believe I should have had over twenty bushels. My usual practice is to sow two and a half bushels to the acre. But for the drought just as it was filling, I should have got the twenty bushels.

RYE.

NORFOLK.

Statement of S. D. Bradford.

The piece of land on which my rye was sown is a gravelly loam, and had been in grass eight years prior to 1854, when in October of that year, it was ploughed. It had not been manured for eight years, nor cared for in any way. In the spring of 1855, it was again ploughed deep, manured in drills with a compost of muck and stable manure, about five cords, and planted to potatoes. The crop looked promising till the first of August, when the rot commenced and destroyed three-quarters of it.

Early in September it was sown to winter rye, Timothy and redtop, in the usual proportions, having been dressed with about four cords of compost above described. The rye came up, and grew very strong and thick before winter. It made rapid progress after the snow disappeared, which was unusually late. It was reaped on the 24th and 25th of July. On being threshed in August, it produced 46½ bushels of winnowed rye, weighing 59 lbs. to the bushel, and three tons and 793 lbs. of straw of a very superior quality. The land on which it was produced contains one acre and thirty-nine rods. Before sowing the rye and grass seed, on the 8th of September the ground was ploughed, and left to get thoroughly dry, after which it was harrowed to break up the lumps. After spreading the manure, it was again ploughed. When sown, it was harrowed three times, so that the manure was well mixed with the soil, and the latter thoroughly pulverized.

Expenses of the crop:—	
Manure,	$24 00
Spreading the same, ploughing, harrowing, sowing,	10 00
Cost of seed,	1 50
Reaping,	12 00
Threshing,	6 00
Interest on land,	12 00
Taxes,	1 50
	$67 00
Value of the crop:—	
$46\frac{1}{2}$ bushels of rye, weighing 59 lbs., equal to 49 bushels of 56 lbs., at $1 per bushel,	$49 00
$3\frac{793}{000}$ tons of straw, at $18 per ton,	61 13
Deduct half the manure,	12 00
	$122 13
Deduct cost,	67 00
Net profit,	$55 13

West Roxbury, November, 1856.

Statement of R. P. Fenno.

The land on which the crop was raised contains 142 rods. It was planted with potatoes last year, and manured in the fall with about two cords of piggery manure, mixed with an equal quantity of loam. The rye was sown the middle of October, one bushel and three pecks per acre. The soil is light and loamy, ploughed shallow with one horse, and harrowed in when the seed was sown. The piece produced forty bushels.

Expenses of the crop:—	
Expenses, seed, &c.,	$1 75
Ploughing, harrowing and sowing,	2 00
Manuring and spreading,	14 00
Harvesting and threshing,	10 00
Interest on land,	6 00
	$33 75

Value of the crop :—	
40 bushels of rye, at $1 per bushel,	$40 00
$2\frac{1}{4}$ tons, straw, at $16 per ton,	36 00
	$76 00
Deduct cost,	33 75
Net profit,	$42 25

Milton, November, 1856.

Statement of Josiah F. Twombly.

The field of rye offered by me for a premium contains one acre and thirty-four rods, and is the same which I planted with corn last year, (less seventeen rods,) a report of which was made to the society. In October of 1855, after the corn was harvested, the land was ploughed with a horse, without any additional manure, and sown with rye. Several rods of the field, which received the wash from the barn, were very rank, and lodged, so that it produced but little, if any, grain. The field was harvested about the middle of August, and produced 52 bushels of rye and 5,050 lbs. of straw.

Expenses of the crop :—	
Interest,	$14 50
Taxes,	2 00
$1\frac{3}{4}$ bushels of seed,	2 18
Ploughing, sowing and harrowing,	3 50
Harvesting, threshing, &c.,	15 80
	$37 98
Value of the crop :—	
52 bushels of rye, at $1 per bushel,	$52 00
5,050 lbs. straw, at 75 cts. per cwt.,	37 87
	$89 87
Deduct cost,	37 98
Net profit,	$51 89

Or, at the rate of $42.78 per acre. Rye, per acre, 43 bushels; straw, per acre, 4,160 lbs.

Milton, October 25, 1856.

NANTUCKET.

Statement of E. W. Gardner.

The sample of rye which I exhibited at our cattle show and fair, was from twenty-two bushels, which I raised at Siasconset, on "Bunker Hill," on eighty rods of land. The land on which this rye grew is sand and loam, on a subsoil of red sand and gravel. It had been used for several years in grass without any manure, until it was scarcely worth mowing. In August of last year, I put upon it broadcast about thirty-seven full cart-loads of what we usually denominate "kelp," but which, in fact, is sea mosses of various kinds, including a large portion of "caragheen," or "Irish moss." This was ploughed in at a depth of about ten inches, and sown with about one-third of a bushel of rye, a peck of Timothy, and five pounds of clover seed, early in September. The rye grew to about six feet in height, and from early spring until it was ripe, its beauty attracted the attention of all passers by. About the time of the last rain preceding our great drought, I counted the grains of several heads in full milk, which numbered from fifty to seventy-two, and at that time it gave promise of a good yield; but the drought ripened it prematurely, and it yielded only twenty-two bushels of grain, and about two tons of straw.

What little Timothy and clover were visible when the rye was cut, soon dried up, and as near one-fifth of the straw was left when cut with the sickle, it was ploughed in, and in the spring will be sown with oats and grass seed.

The value of the crop is as follows:—

22 bushels of rye, at $1,	$22 00
2 tons of straw, at $10,	20 00
Half the value of the manure,	9 25
	$51 25

The cost of the land was $75, the interest of which is	$4 50
" manure,	18 50
" ploughing and planting,	3 00

The cost of the seed of rye, ...	$0 50
" harvesting and threshing, ...	8 00
	$34 50
Net profit on half an acre, ...	$16 75

Had the straw been closely cut, it would have added at least $4 to the crop, making the net profits equal $41.50 per acre. As it was, the profit was $33.50 per acre.

There are on our Island, thousands of acres of land, every way as good as this, and which, with the same outlay of manure, will produce as much, but which have been lying waste for ages, and can now be bought for the small sum of from $2 to $10 per acre. In view of these facts, why need we repine that the whales are growing scarce and more scarce every year? When has an outlay in any whaling voyage produced an equal percentage of profit with this half acre of rye? What has been done with this half acre, may be done with thousands of acres. This has produced over 100 per cent. per annum, which would be nearly equal to 400 per cent. for the time which it takes to complete a whaling voyage.

While I would be among the last to say a discouraging word to those who prefer to follow the business which has made Nantucket what it is, I would yet be among the first to say a word of encouragement to every one, who, from want of success in other business, or from any other cause, is disposed to become a "practical farmer." And I would by all means endeavor to show to those who have some capital, but not enough to live on without labor, and who wish to invest in a farm, that it is not necessary that they should, in the evening of their lives, tear themselves from friends, relatives and homes, with all the dearest memories and associations of the earliest and best part of their days, to find some new friends and new homes in some distant country. I would show them that here, in their own "Island Home," among their old friends and early associations, they may reap a rich reward for their labor and their money.

OATS.

HAMPSHIRE.

Statement of Albert Montague.

The land on which I raised my oats, is a sandy loam. It was in corn last year, when I ploughed in twenty-eight loads of manure. The piece contains one and three-fourth acres, and was ploughed the last of April, seven or eight inches deep. I harrowed it well, and rolled it. I sowed seven bushels on the piece, cut the oats the first day of August, and threshed them in September and October.

Value of the crop:—		
136 bushels of oats, 50 cts., ...	$68 00	
3 tons of straw, at $8, ...	24 00	
		$92 00
Expenses:—		
Seed, ploughing, sowing, $8; harvesting, $11, .	$19 00	
Interest on the land, ...	7 00	
		$26 00
Net profit, ...		$66 00

SUNDERLAND, November 15, 1856.

BEANS.

PLYMOUTH.

Statement of R. A. Littlefield.

The half acre entered by me for premium on white beans, is a light, sandy loam. The largest portion had been planted to corn or potatoes for five or six years previous, there being on it a young orchard of apple and pear trees. I spread on fifteen horse-loads of barn manure, ploughed it in eight inches deep,

and harrowed it thoroughly. I planted it the 10th of June, in rows two feet wide, and in hills eighteen inches apart, putting three or four beans in a hill. Hoed twice, and harvested the 10th of September, and obtained fifteen bushels and twelve quarts.

They were pulled when sufficiently ripened to be used for "green beans," as the bean has a better flavor and is more tender when gathered at this time than when permitted to stand until it is dry, though the crop will be somewhat less, as a few of the latest pods will be lost. I think there would have been half a bushel more had they stood until ripe.

Expenses:—		
Manure,	$10 00	
Ploughing,	2 00	
Planting,	2 50	
Hoeing,	4 00	
Harvesting,	3 00	
Seed used,	1 50	
		$23 00
Value of beans, at $2.50 per bushel,	$38 12	
" fodder,	2 50	
		$40 62
Profit,		$17 62

BROOMCORN.

FRANKLIN.

Statement of Albert Montague.

The piece of land on which my broomcorn was raised is in Sunderland meadow, and contains one acre. The field was in broomcorn last year, when I applied eight loads of manure, spread broadcast and ploughed in. Yield, about 900 lbs. per acre. Having removed the stalks, I ploughed the piece the 18th of last May, about seven inches deep. I put ten loads of

compost manure on the acre, applying it in the hill, and planted it the 20th of May; hills two feet four inches, and rows about two and a half feet apart. Hoed three times, taking great care the first and second times to have the stalks left so that no one should crowd its neighbor to the injury of either. I harvested about the 10th of October. Finished the scraping the 13th of November.

The following is the value of the crop, and the expenses, as near as I can estimate them.

Value of crop:—		
1,159 lbs of brush, at 7 cts. per lb.,	$81 13	
88 bushels of seed, at 45 cts. per bush.,	39 60	
Total value,		$120 73
Expenses:—		
Manure,	$10 00	
Ploughing and planting,	3 00	
Hoeing, $8; harvesting and scraping, $10,	18 00	
Interest on land,	9 00	
Total,		$40 00
Net profit on one acre,		$80 73

SUNDERLAND, November 15, 1856.

Statement of N. Austin Smith.

The piece of broomcorn entered for premium contains one acre and four rods of sandy loam. In 1855, it was in a low state of cultivation. Ten loads of good barn manure were ploughed in, and the piece was planted with broomcorn. The yield was 700 lbs. of brush, and 50 bushels of seed. After harvesting, the stalks were harrowed down, and ploughed in nine inches deep, last spring, and rolled down smooth. On three-fourths of it, 300 lbs. of guano mixed with 150 lbs. of plaster, were sown broadcast and ploughed in; on the remaining portion four loads of good manure were scattered in the furrow, and planted the 18th of May with Woodward's planter, dropping a little plaster in the hill, and about five quarts of seed per acre; the rows, three feet apart, and hills in the rows two and a half feet; cultivated level, hoed three times and harvested

from the 15th to the 18th of October. During the summer, that grown upon the guanoed land was of a darker color and a few days later. At cutting, there was but little difference in the crop, with a decided advantage, on the score of economy, in favor of the use of guano. The yield was 1,041 lbs. of brush, and 80 bushels of seed, weighing 45 lbs. to the bushel.

Value of crop:—		
1,041 lbs. of brush, at 7 cts., . . .	$72 87	
80 bushels of seed, at 45 cts., . . .	36 00	
		$108 87
Expenses:—		
Harrowing stalks, ploughing and rolling, .	$2 50	
Guano and plaster on $\frac{3}{4}$ of an acre, . .	9 75	
Manure and applying on $\frac{1}{4}$ acre, . . .	6 00	
Planting and seed, ...	62	
Hoeing, ...	6 00	
Harvesting and scraping, ...	10 00	
Interest on land, ...	10 00	
		$44 87
Balance in favor of crop, . . .		$64 00

SUNDERLAND, October 30, 1856.

ROOT CROPS.

ESSEX.

From the Report of the Committee.

The committee have examined with care the several statements of culture, with the certificates required by the rules of the society. They regret that they could not have viewed these crops when growing, because in this way alone can be seen those peculiarities of culture, the development of which is the primary object for which premiums are offered. It is not enough to cause a crop to grow larger than any one else, because he

who can accumulate the largest heap of manure can usually accomplish this;—but it is to raise the best crops, with the best economy, in such a way as can be imitated.

The committee are surprised to find so few claimants for the liberal premiums offered for root culture, in a county where they know so many fine crops are raised, and where the lands can be in no other way so profitably cultivated. The committee know of many neighborhoods, where half a dozen acres under judicious root culture, yield a better profit than one hundred acres under ordinary farm culture. But so it is, and will continue to be; what has been done by others will be repeated.

For onions, but one claim was presented,—this by George W. Adams, of Newbury. Mr. Adams grew on half an acre of land, 328½ bushels, weighing 50 lbs. to the bushel. This, the committee consider a good crop, and well entitled to the premium.

The committee have learned from some of the successful cultivators of the onion crop in Danvers, that they find much benefit in ploughing their land in autumn, turning in the manure at the same time. The side-hill plough is generally used by them. We know one farmer who treated his land as above mentioned, and raised 1,500 bushels on two and a half acres the present season. He thinks he gained twenty-five per cent. in his crop by the operation.

For carrots, there was only one claim. Mr. Brown, of Marblehead, raised on half an acre 16 tons and 1,475 lbs. This the committee consider a very good crop, and worthy of the premium of ten dollars.

J. W. Proctor, *Chairman.*

Statement of George W. Adams.

Onions.—The half acre of land where the crop of onions which I entered for premium grew, was cultivated as follows: An acre, of which this is one-half, was ploughed in the spring of 1853, and planted to corn that year and the next, manured in the hill only, the first year; the next, a moderate dressing was ploughed in pretty deep, and a small shovelful of compost in the hill.

The yield of corn was fair. In the spring of 1855, about

seven cords of compost were ploughed into this half acre, and onions sown; the crop was little short of 200 bushels. Fourteen dozen cabbages also grew where the onions were eaten by maggots. Last spring it was dressed with five cords of compost. This was prepared by mixing with three cords of marsh mud and earth from the margin of the field, (near an old wall,) in about equal proportions,—one and a half cords of cattle manure and half a cord of fresh horse manure. It was very carefully mixed, and made perfectly fine. The horse manure was used to produce fermentation. As soon as the heap was hot, it was spread evenly, and ploughed in five inches deep as fast as spread. It was made fine as possible with a harrow and hand-rake, and sown with Danvers seed, (two pounds,) on the 8th and 12th of May. The ground was weeded four times. The onions were of remarkable uniformity of size, ripe and of good quality. The land is a fine loam of fair quality.

The cost of cultivation, partly by estimation:—

Ploughing,	$1 00
Harrowing and raking,	2 50
Sowing,	75
Weeding,	25 00
Harvesting,	12 00
Seed,	3 00
Five cords manure,	20 00
	$64 25

The onions, at a cent a pound, are worth $164.25. Profit, $100.

Newbury, November 11, 1856.

Statement of Ephraim Brown.

Carrots.—I herewith submit a statement of the following crop of carrots on one-half acre:—

The land on which the carrots were raised this season, (1856,) was planted three years in succession, first with squashes, then with cabbages, and the last with potatoes. It has been manured each year with a compost of rotten kelp and barn manure, say

eight cords to the acre. The carrots were sown the 20th of May, in rows seventeen inches apart. The land was measured and thirteen tons of the carrots were dug, forty bushels to the ton, measured and put into the cellar, and about three and three-fourths tons were carried to market, the crop being but little short of seventeen tons.

MARBLEHEAD, November 15, 1856.

HAMPSHIRE, FRANKLIN AND HAMPDEN.

Statement of F. H. Williams.

CARROTS.—The piece of ground on which I raised my carrots, has grown a like crop for two years past, and is of a sandy loam. On May 22d I ploughed in twelve loads hog manure compost, nine inches deep. The piece measures 115⅝ rods, and produced 16,763 lbs., or 372½ bushels, calling 45 lbs. to the bushel. In the place of digging the carrots as usual, I ploughed with horses the whole land, going round the piece, pulling out carrots and breaking off the tops, after the team. By this arrangement, I save handling the whole crop once, which is no small matter. My root cellar is immediately under my barn floor, so that by means of a trap door I can dump a load of carrots into my cellar as easily as a load of dirt on the ground, which greatly lessens the cost of harvesting.

Expenses:—		
Compost and carting,	$12 00	
Ploughing and harrowing,	2 25	
Planting, hoeing and seed,	20 10	
Harvesting,	7 00	
Taxes and interest on land,	6 00	
		$47 35
Value of crop:—		
372½ bushels, at 35 cts. per bushel,		$130 20
Profit,		$82 85

SUNDERLAND, 1856.

HAMPSHIRE.

Statement of George Dickinson.

POTATOES.—The ground, which I planted with Carter potatoes the past season, contains 86 rows, and is valued on the assessors' books at $195 per acre, first quality meadow land. It was stocked down with Timothy and clover in 1851, and mown four years, twice each season, without any manure. In the first week of December, 1855, it was ploughed from eight to ten inches deep, the sod having been flatly inverted. During the last of April, 1856, six loads of manure from the hog yard were spread on and cultivated in. The ground was then thoroughly harrowed, and the holes dug, two by two and a half to three feet apart. A mixture of hen manure and plaster was then applied, at the rate of a small handful in each hill. I used 3½ lbs. of seed; cut the largest potatoes twice, and the smaller ones once, and dropped one piece in each hill. They were hoed early in April, soon after they came up, and three times afterwards, the cultivator being used each time, and moderately hilled. They were dug about the middle of October.

Value of crop:—		
95½ bushels table potatoes, at 87½ cts., . .	$83 56	
13¼ bushels small " 25 cts., . .	3 31	
		$86 87
Expenses:—		
Ploughing, $1.25; manure, $11.25; cultivating, $1; harrowing, 50 cts.; seed, $2.25, . .	$16 25	
Planting, $1.25; hoeing, $3.50; digging, $6.25; interest, $6; taxes, $1, ...	18 00	
		$34 25
Net profit, ...		$52 62

HADLEY, November 15, 1856.

Statement of O. and F. H. Williams.

POTATOES.—The land which produced the crop, has been a pasture three or four years. The soil is light and sandy, side hill, descending toward the south-west. April 24th, we ploughed from three to six inches deep. The furrows were turned and filled with manure, after the potatoes were dropped, together with a handful of plaster and salt. These were turned back, covering all about four inches deep, and saved at least one-half, if not three-fourths the labor of planting with the hoe. Our seed was the genuine peach blow. We hill with all the dirt we can, and imitate, in this respect, the Irish mode of tillage, which we consider preferable to flat tillage. We used small potatoes, put one into each hill, and where they were large, cut them and used at the rate of eight or nine bushels per acre.

Value of crop:—		
123 bushels, at 50 cts., ...		$61 50
Expenses:—		
Ploughing and harrrowing, $2; manure, $8; manuring, furrowing and covering, $2.80, .	$12 80	
Seed, $1.20; hoeing, $3.50; weeding, $1.25; harvesting, $8; interest and taxes, $2, .	15 95	
		$28 75
Net profit, ...		$32 75

SUNDERLAND, November 15, 1856.

Statement of David Hubbard.

CARROTS.—The land is a sandy, gravelly loam, which has produced corn the past two years, measures 66 rods, and is in a fair state of cultivation. I ploughed in May, and subsoiled fifteen inches deep. I put on twenty loads of compost manure, ploughed in ten loads, harrowed in the other ten, and raked thoroughly. I planted about the last of May with one of Nourse, Mason & Co.'s seed-sowers, about one-third of a pound of pure orange carrot seed, in rows eighteen inches apart. At the third hoeing, I thinned, leaving them from three to five

inches apart, and sowed with Swedish turnips, where the carrots were missing.

Value of crop:—		
$272\frac{8}{11}$ bushels, 55 lbs. per bush., at 33 cts., .		$90 00
Expenses:—		
Manure, $15; ploughing and harrowing, $2; seed and sowing, $1, ...	$18 00	
Carting and spading manure, $2; hoeing, $8; harvesting, $7; interest, $2.50, . . .	19 50	
		$37 50
Net profit, ...		$52 50

SUNDERLAND, November 15, 1856.

NORFOLK.

Letter on Carrots.

Hon. MARSHALL P. WILDER, *President, &c.*

Dear Sir:—You ask for *facts* in relation to the cultivation of carrots, and the product per acre.

I have had five successive crops, (1853–56,) the yield varying from 850 to 950 bushels per acre, and from one to two acres under cultivation.

The soil, naturally good, having a thick loam surface, and clay and gravel subsoil; rather too wet, and never having been drained and subsoiled. I hope for increased product. It has been ploughed once in autumn and twice in the spring. Southern slope of a hill, and well cleared of stones.

The first year I put on seven to eight cords of manure, the land having previously been badly used; subsequently, about six cords of cow and horse manure. The rows twenty-four inches distance for four seasons; at the last, eighteen inches. Three weedings by hand. I think I should have been a gainer by giving seven or eight cords of manure.

At forty bushels a ton of two thousand pounds, the crops have averaged twenty-four tons. Sold, deliverable on the ground, at $11 per ton, and if delivered, $12 per ton. In

the spring, prices are two to four dollars higher. At $10 to $12 per ton, carrots, I apprehend, are cheaper food than hay at $25 to $30 per ton, or oats at sixty cents per bushel,—equal to two cents per pound against carrots at half a cent per pound.

My experience is too limited to give much weight to my returns, but I am satisfied that carrots, at 600 to 700 bushels per acre, are more profitable than hay, potatoes or maize, at such an extent as would be required for the consumption of Massachusetts. But farmers whom I have consulted say they are unprofitable, and one may see the reason by reference to the returns, which give 220 to 428 bushels to an acre, costing probably nearly as much per bushel as my 900 bushels.

I apprehend that fifty per cent. more potatoes and hay can be obtained from our lands, if their cultivators would devote more labor and capital to them, and emigrate less West, where capital is wanting. The average of hay, (English hay,) in this State, is under one ton per acre. I get two tons on the average of seasons, with moderate top-dressing every year or two. The expense of cultivating will not much more than meet the expenses; but it would be otherwise in the hands of farmers.

Massachusetts, poor as she is in soil and limited as it is in quantity,—with three or four months less time in the field than in the Southern and South-western States,—produces a larger amount of commodities than South or North Carolina; and much may be added to the existing quantities, if more knowledge, skill and enterprise are applied to agriculture.

If I am right in these views, you must, when addressing the farmers, say what you think on the subject.

Yours truly,

HENRY LEE.

BOSTON, December 8, 1856.

CRANBERRIES.

NORFOLK.

Remarks on the Cultivation of Cranberries.—By Rev. C. C. Sewall.

The cranberry is universally regarded as one of the most valuable and delicious fruits. Its general use and ready sale have made it an important article of commerce. Its cultivation requires no large outlay of expense, and is attended with no more difficulties or disappointments than are common to all fruit culture, while its harvest is, ordinarily, one of the most remunerative of all the products of the farm.

There are many acres in this county already devoted to the growth of this fruit. The estimated value of the crop for the last year, 1855, was greater than that of either of the small grains,—oats, rye, barley and wheat,—or than that of any vegetable production except potatoes. But it is believed that the quantity and value of this fruit may be increased very largely, without impoverishing our farms, or endangering the profitable sale of the article in the market.

We are reluctantly compelled to defer any particular description of several extensive cranberry meadows, which were visited by us during the past summer. Of one in Franklin, planted and nurtured with great care, and now affording the best promise of large returns, we shall give a full account when the result of the experiment is completely established. Of another, owned by Captain Tucker, of Canton, and familiarly known as the "Punkapoag Meadow," we shall here only state that it exceeds in extent and value any within our knowledge, and is yet capable of being greatly enlarged, by the removal of the coarse grass and low bushes which obstruct the growth of the vines. This process the owner is gradually effecting, and will have, when completed, forty acres or more of cranberry vines. It is not many years since any systematic endeavors to increase and preserve the crop were commenced. Indeed, it is a well authenticated tradition, that a large portion of the meadow was the

fishing ground of men not long since deceased. The soil is exceedingly moist, and by a slight pressure of the foot a large area of surface is easily shaken. There are many patches where the vines have completely covered the surface, and were full of berries. We saw fifteen able bodied men employed in gathering the berries, and understood that they would be occupied, in this work, for six weeks. They were using the rake, but were required to pick by hand any fruit which it did not gather, and thus the whole was thoroughly gleaned.

It is worthy of remark how attentive is the owner of the meadow to provide for the comfort of these laborers, who are exposed to stand in the water many hours each day. Probably much of his success may be attributed to his kind treatment of those who thus wrought faithfully and with more than ordinary care for his benefit.

It may not be improper to state that, for the berries gathered upon this meadow last year, the owner received, in a single payment, $3,250; and that the crop was enlarged, the present year, to at least 1,500 bushels, which was all contracted for by one firm, at eight dollars per barrel.

Many of the natural cranberry meadows in this county are liable to much injury from late and early frosts, which destroy,—the one the blossoms, and the other the ripening fruit; nor can this evil be guarded against except the advantage be had of easily flowing the land. The danger of such injury, however, is less upon the seaboard than in the interior, and in the upland culture than in low meadows. Near the sea the finest and most hardy fruit is grown, on beds of pure moist sand often washed by the waves; and in other localities, by upland culture, on a good soil, with the use of peat, or other absorbent, as a covering. On the borders of large rivers, where freshets occur, the growing crops are often destroyed by being overflowed too long. This has been the case, to a great extent, in our own county this year, along the banks of the Charles and Neponset rivers. There is, too, another evil, and which results from the artificial flowing of extensive tracts of meadow, for the growth or preservation of cranberries. Where the water is allowed, as is commonly the case, to remain upon the meadow till after vegetation has commenced, and is then only gradually removed, or is renewed on the first apprehension of early frost, a malaria is often created,

by evaporation, injurious to the health of all nearly exposed to it. Instances of such evil are not unknown to medical men, and the fact is worthy of consideration, in connection with the increased cultivation of cranberry meadows.

For these and other reasons, we are disposed to recommend more attention to the upland culture of the cranberry. We believe it to be attended with less risk, and productive of a fruit equal, if not always superior, to that grown in meadows, whether naturally or by cultivation. An instance of most successful cultivation of this sort, in Essex county, has been brought to our notice by a friend, whose account of it we here introduce.

"Mr. Needham's cranberry patch is situated on the lower side of his garden, in front of his house. The land is high, though the position of the bed is in a valley of somewhat moist land, but good for the products of a garden, or for Indian corn. It cannot be called meadow, in any sense of that term. It has been used for field and garden culture, for many years, by the present proprietor and his ancestors. The probability is, that, being in a hollow, it has been fertilized by the wash from the adjacent hills, as well as by applications made to it of manure.

"Mr. N. obtained the plants from the neighboring meadows, and has watched them with unremitted attention,—never suffering the growth of chickweed, grass, or any weed whatever, among the vines, and always doing his work so early that the removal of weeds does not disturb the delicate fibres of the growing cranberries. In fact, his son told me this was the grand secret of his father's success in growing the cranberry; and that the end could not be accomplished without patience and persevering industry, such as his father had applied. His products have always given him a fair compensation for all his labor. He has realized from the sale of his berries, the present season, nearly four hundred dollars, and could have readily sold as many more at his price,—four dollars per bushel. Whoever has used them would prefer these to cranberries grown on wet meadows, at half price. He gathers his fruit by hand, carefully avoiding any disturbance of the roots of the plants. He applies no fertilizer whatever, except mud from the meadow, after it has been pulverized by frost, and this for the double purpose of checking the growth of grass and weeds, and of retaining a moisture for the benefit of the plants. The cranberry is

a dear lover of water, and wants nothing stronger, and in this particular, is well entitled to our confidence."*

C. L. Flint, Esq., the Secretary of the Mass. Board of Agriculture, says, in his admirable Report of 1853: "The experiments which have already been made, clearly show the practicability of raising cranberries on upland. I have seen flourishing plantations of them on all varieties of soils, from a high and light gravelly loam to a very deep, rich, garden soil. Indeed, the universal opinion seems to be that such cranberries are better than those growing naturally in wet meadows. In the instances which I have seen, the land had been carefully ploughed and prepared, as it usually is for strawberries, or plants of that description. The plants were taken from their original situation in the manner described, in the sod, and freed from grasses and roots; they were then put into shallow trenches or drills, dug for the purpose, about two and a half or three feet apart. In consequence of the large space left between the drills, constant and careful attention was necessary for two or three years, so that far more labor was spent on them than the same area of strawberries would have required."

The chief obstacles to the upland culture of the cranberry appear to be the difficulty of preventing the growth of grass and weeds, and the necessity of preserving moisture in the soil. These are, neither of them, it is proved, insuperable; and we apprehend that, on soils similar to that alluded to in both the foregoing extracts, some other substance than meadow mud might be used with advantage for both purposes. Perhaps spent tan, pure beach sand, or where these cannot be had, any fine sand, put between the vines, would retard the growth of grass and weeds. Salt and plaster would absorb and retain moisture; and the former we think to be most serviceable, if not necessary,

* We copy the following from a late issue of the Salem Register:—

"*Cranberries.*—Elias Needham, Esq., of West Danvers, has a lot of upland, bordering upon the Danvers Railroad, containing five-eighths of an acre. Upon this, some five or six years since, he set out cranberry plants, and has cultivated them with great care. This year he picked ninety-seven bushels of excellent cranberries, which he sold for four dollars per bushel; and besides these there were some ten bushels of damaged berries. From trees on the same land he picked fourteen barrels of apples, which he sold for four dollars per barrel,—making the gross income from five-eighths of an acre, four hundred and forty-four dollars!"

to the perfection of the fruit, from the fact that the best cranberries are grown nearest the sea. The experience of cultivators, too, confirms the supposition.

We recommend further trial of the upland culture of the cranberry, because we believe it to be perfectly practicable, and that multiplied experiments may bring to light advantages in it sufficient to give it claims to more general regard, if not to precedence over any other. Among the products of the garden, few would be more desirable, or more easily cultivated and protected from frost, or supplied with moisture. And the value of it, in this regard, should commend it to more general attention.

Considering the uncertainty of the crop, in consequence of the frosts and freshets, we think that meadows may be more profitably devoted to the growing of grass, unless cranberries are already growing naturally there, and the right and the means of controlling a neighboring stream of water belong to the cultivator.

From the volume recently prepared and published by the Secretary of the Commonwealth, on the Industry of Massachusetts, we have gathered the following facts in relation to the cultivation of cranberries.

ABSTRACT

Of the quantities of Land on which Cranberries were grown in the several Counties of the State, in 1854; *the value of the whole Crop; the average value of it per acre; and the value of the Land per acre.*

Counties.	Acres.	Value of Crop.	Val. of Crop per Acre.	Value of Land per Acre.
Barnstable,	197	$16,916 00	$85 86	$50 00 to $470 00
Berkshire. No returns.				
Bristol,	380	12,282 00	32 32	15 00 to 90 00
Dukes,	14	1,296 00	92 51	27 00 to 142 00
Essex,	370	8,488 00	22 94	2 00 to 125 00
Franklin,	9¼	505 00	55 34	40 00 to 60 00
Hampden,	13½	439 00	32 51	20 00 to 100 00
Hampshire,	5	40 00	8 00	16 00
Middlesex,	2,551⅜	29,274 00	11 46	2 00 to 253 00
Nantucket,	19¾	1,140 00	57 72	18 00
Norfolk,	807	30,000 00	37 17	20 00 to 60 00
Plymouth,	361½	12,098 00	33 46	10 00 to 250 00
Suffolk. No returns.				
Worcester,	641¼	22,720 00	35 43	5 00 to 60 00
Total and Aggregate,	5,372½	$135,198 00	$25 17	$2 00 to $470 00

FARM IMPLEMENTS.

MASSACHUSETTS.

From the Statement of the Trustees.

Not less interesting in the transactions of the society, of the present year, and of special importance, also, to the agricultural community, has been the competition for the premium on mowing machines. Every step made to save menial labor by the use of machinery in tilling the soil, and in bringing agriculture as nearly as possible under the control of labor-saving implements, is in the right direction. The principal means of accomplishing the economy of human labor in agriculture, as in other departments of industry, are the exercise of skill and the employment of machinery, both of which indicate a high state of advancement, and may be regarded as a true test of its progress.* There are two principal points, therefore, in relation to this subject, to which attention ought to be directed; one is, the introduction of agricultural implements, in all cases where their profitable use can be satisfactorily ascertained; the other is, that these implements be manufactured at as low a cost as possible consistent with perfect workmanship. It follows, of course, that the more general the use of any instrument is, the cheaper it can be afforded; but it is also true that, for want of skill and care in their manufacture, farmers often suffer much inconvenience, and are discouraged from purchasing and using many implements for farm work, of a really useful and labor-saving character.

Last year the trustees offered a premium of six hundred dollars, to the person who shall cut not less than fifty acres of grass by a machine moved by horse or ox power. The object which the trustees had in view, was, principally, to bring out skill in the use of a mowing machine comparatively new, without reference to the particular merits of the several kinds then offered to the public. They felt strong hopes, also, that so large a premium would incite many to try the experiment of mowing

* For a full illustration of this remark, as applied to agriculture, see "The Journal of Agriculture, &c., of the Highland Agricultural Society of Scotland." No. 53. New Series.

with a machine, who would otherwise wait to see whether it was successful or not. In this they were not disappointed, the number of competitors for the premium having been large, and the competition very close.

It will be seen by referring to the report of last year, that although there was but one opinion, upon the economy of the machine over scythe mowing, there was a general complaint of bad workmanship; and as each competitor was obliged to report every accident which his machine met with, it did not require complaints on the part of competitors to convince the trustees that *there was a screw loose somewhere*. No machine went through the trial without more or less breakages, which, although generally of a trifling nature, involved a certain loss of time.

The offering of the premium of last year resulted most successfully, since it developed a skill which has been too long dormant, and demonstrated very clearly that the mowing machine, if well made and constructed upon correct principles, might be successfully introduced and used as a great labor-saving implement throughout the State.

Having arrived at this point, the importance of perfecting this labor-saving implement, and of having one constructed that should unite every possible requisite to make its use general, being fully shown by the trials of last year, the premium of one thousand dollars was offered for the best mowing machine, to be awarded the present year. In order to do justice to competitors, and to arrive at a satisfactory result upon the merits of different machines offered in competition, the machines were subjected to separate trials in every possible way, under the inspection of three gentlemen, distinguished for their good judgment and knowledge in every thing pertaining to the matter confided to them, viz.: Col. Moses Newell, of West Newbury, Col. T. W. Ward, of Shrewsbury, and Thomas E. Payson, Esq., of Salem. They undertook the task, with a full conviction of the importance of the duty assigned to them, and devoted themselves to it with unwearied zeal. Their report, which is appended, speaks for itself, and shows the care and labor they bestowed upon the matter, and the conclusion which they arrived at, met with the unanimous approval of the trustees, who, in accordance with the report of the committee, awarded the premium of one thousand dollars to the Heath machine, entered by D. C. Henderson, of Chicago, Illinois.

The trustees have now done all that lies in their power to introduce the mowing machine into use as a great labor-saving implement. They hope not only that it will be adopted, but that it will lead the way to the use of others equally labor-saving and quite as essential to the prosperity of agriculture in Massachusetts. Nor does there seem to be any reason why almost all the labor of the hay harvest, which is at present the most trying and expensive in its nature of any of our farming operations, should not be done by machinery worked by horse-power. The mowing machine, the hay-maker,—such as is now in use in England,—and the horserake, with the aid of two men and three horses, are quite competent to perform the work now required of twelve or fifteen men, allowing only one man per day to the acre, for cutting and making hay.

The farmers have also a duty to fulfil. It it only by their purchasing labor-saving implements, and using them whenever it is in their power to do so, that they can be perfected. In this way encouragement is given to invention and mechanical skill. Agricultural associations, with their addresses and their premiums, are valuable only as the pioneers in the march of improvement. They can direct public attention to objects, but they cannot accomplish much unless a right spirit exists in the breast of every tiller of the soil. Their labors are of little avail unless their recommendations and exhortations are met by the ready zeal of all. The great cause of agricultural improvement will always falter and move with feeble steps, when those who have it in hand are out-numbered by the listless and apathetic. The obstacles in the way of success to a Massachusetts farmer, are serious enough under the most favorable circumstances, but they are perfectly discouraging unless they can be met by the united will and firm purpose of all to overcome them. Careful investigation, and the experience gained even by common observation of what is passing in other lands, must convince every reflecting person, that agriculture as a pursuit must languish, unless more strenuous efforts are made to increase our mechanical skill in the cultivation of the soil; and it is from this strong conviction, that the trustees thus earnestly speak upon the subject.

EDW. LYMAN, *President.*

Richard S. Fay, *Rec'g Sec'ry.*

Report of the Committee on Mowing Machines.

To the Trustees of the Massachusetts Society for the Promotion of Agriculture:—

The subscribers, selected by your Honorable Board to inspect the work of the different mowing machines entered for premium, and to judge of their merits, respectfully report:—

Of the number who had signified their intention to compete for the premium, there were, at the time of our appointment, ten who had complied with the conditions on which it was offered, and had given notice of the places selected by them for the operation of their several machines, to wit: Messrs. J. C. & D. Elliott, A. Dietz, Howard & Wood, Nourse, Mason & Co., J. P. Adriance, A. D. Briggs, R. L. Allen, Jones & Thompson, E. Danforth & Co., and D. C. Henderson.

These competitors were all notified to be in readiness to mow five acres or more of grass in our presence, at the several places by them selected for that purpose, on a particular day named, a day having been assigned to each.

The Messrs. Elliott, Dietz, and Howard & Wood gave notice that they were not prepared to exhibit their machines at the time appointed, and withdrew from the contest.

Messrs. Jones & Thompson exhibited their machine, but did not attempt to mow five acres. They likewise withdrew from competition. Their machine was new, had scarcely before been tried in the grass, and its operation probably afforded as little satisfaction to them as it did to us. In its main features, and particularly in its cutting arrangement, it resembles the machine of E. Danforth & Co. As we shall notice that machine here after, it is not necessary to give a further description of this.

The six other competitors each cut more than five acres of grass, the time occupied varying little on the average, from one hour to an acre. The machine entered by Mr. Adriance, was the only one which did its work in less than that time. Five acres and twenty-seven rods were mowed by him, in four hours and fifty-one minutes. In speaking of the time occupied, no deduction is made for stops.

It will be readily seen that these trials furnished very insufficient data by which to judge of the comparative merits of the different machines.

The ground had, in all cases, been selected by the competitors themselves, or by some one in their behalf. The character of the crop, and the condition of the surface varied in different localities. Generally favorable to the successful operation of a machine, some lots were much more so than others. In several instances, horses and driver were perfectly familiar with the working of the particular machine which they used, and both understood exactly what to do to show it to the best advantage. Others were worked at great disadvantage in this respect, and in one case neither horses nor driver had ever seen a mowing machine before.

In order, therefore, to give the machines a fair test on equal footing, as well for the competitors as for our own satisfaction, we concluded to operate them ourselves in the same field, under similar circumstances and in similar grass, with the same pair of horses, and a driver who had no interest in any machine. This seemed to us the readiest and most feasible mode of testing the machines, and in fact the only mode which would enable us to arrive at a decision at all satisfactory, and for which we could give a sufficient reason.

For this purpose, three lots of grass, differing in quantity, quality and situation, were obtained on the farm of Mr. Thomas J. Field, in Northfield, a driver procured who was entirely unacquainted with mowing machines, and five of the competitors notified to have their machines at Mr. Field's farm on the morning of the 29th of July. In the trial, the owners of the several machines were directed to give the driver just such instructions as they saw fit in relation to the management of their machines. Our only instruction to him was, to drive them all as nearly as possible at the same rate of speed.

E. Danforth & Co. were not notified, because, in our opinion, there is an objection to their machine, apparent on inspection, which must prevent its general use in New England. It has two sets of cutters or knives, worked by a double crank in opposite directions, the edges of the blades of the under knife being serrated, and in their operation cutting very like shears. It has no fingers and of course no finger bar, and is probably as little liable to clog as any other machine. In many parts of the West, where it is manufactured, and where a mower may be used a whole season without once touching a stone, it

undoubtedly works well. There a blade is rarely broken, while here they are constantly liable to damage, and are in fact often broken. In other machines the blades are riveted or bolted, or otherwise secured to the knife-plate, so that, in case of injury, one can be more or less readily substituted for another. The blades of Danforth's knives are not bolted or riveted upon a knife-plate, but plate and blades are one entire piece of steel, like a saw with very large, blunt teeth. They are, in fact, saw plates. The only way to repair a broken blade, therefore, is to weld it. Now we take it that few mechanics, in a machine-shop even, can weld a broken saw-tooth without injuring or destroying the entire plate. Certainly, in the country, the place where mowing machines are to be used, nobody could be found able to do it. A broken blade would probably involve the necessity of an entire new knife. This seemed to us an insuperable objection to the machine, without looking for others which may or may not exist, and for that reason we did not desire to put the Messrs. Danforth to the trouble and expense of a further trial.

The five other machines were upon the ground at the time appointed, or on the next morning.

The first lot of grass mowed contained about six acres, sown with Timothy in September last. The bottom was not thick, and the ground very far from being swarded over, might appropriately be termed dirty. The crop was not heavy, but uniform in quantity and quality. An acre was mowed by each machine.

We were satisfied at this trial, that any further experiment with the machine patented by W. H. Hovey, on the 15th of April of the present year, and entered by A. D. Briggs, was not desirable.

Without a drawing it would be difficult for us so to describe its several parts as to make ourselves understood. It is, perhaps, enough to say, that the blades are not bolted or riveted to the knife-plate, and are yet so fastened as to be held firmly and securely in their places by an arrangement so simple that any farmer or laborer can substitute one for another without the aid of a mechanic, and almost without the aid of hammer or wrench, in an instant of time. This we consider a great merit. The knife-plate covers the finger-bar entirely, and being constantly in motion when the machine is in operation, leaves no

stationary surface for the cut grass to fall and rest upon. This is claimed, by its inventor, as a great advantage. In its workmanship, also, it is quite equal to either of the other machines. But the amount of draught required to operate it, makes it a very severe load for a pair of the stoutest horses. Whether the power is wrongly applied, or whatever may be the cause, the fact is so. This, if there were no other objection, makes the use of it to any extent, in its present form, entirely impracticable.

The four other machines were tried upon another lot of grass, on pieces of equal dimensions, each in succession, both when the grass was wet, and dry. This was a heavy crop of clover, Timothy and redtop, mixed, some of which was lodged. Portions of the lot were rolling, and the surface generally quite as far from level as are our ordinary grass fields, so that upon the whole, it was an excellent lot to test the machines.

They were also tried on a meadow bottom which had never been ploughed, where various natural grasses, both coarse and fine, were intermixed.

The trial, you will thus perceive, was a thorough one, and by it we were able to form a satisfactory judgment of the merits of the different machines. The remaining machines and between which we were to judge, were patented or known as Ketchum's, Manny's, Heath's, and the Allen machine, entered by R. L. Allen. The owners of the Ketchum machine allege that Mr. Allen has infringed upon their patent, and has no right to build or sell his machine, except within the limits prescribed in a license procured from them, and that Massachusetts is not within those limits. However that may be it is of no consequence so far as our report is concerned, for we did not regard the consideration of that question as within our province, and it therefore had no weight with us. The Ketchum machine, entered by Nourse, Mason & Co., has probably been in use longer in this State, and is more generally known, than either of the others. The one which they entered for premium differs from those which have been built by them in years past, in having a driving wheel of comparatively small size, wrought iron substituted for castings wherever it was deemed practicable, and every thing about the machine so made as to reduce its weight. In this they have succeeded; their machine, with pole and whippletrees

attached, weighing only about 460 lbs. The price of the machine has also been reduced from $100 or upwards, to $75. We think that in this they have made no mistake, but that the reduction in weight is a great mistake. The difference in the amount of draught required to operate a machine of 400 lbs. weight and another of 700 lbs. weight, other things being equal, would probably be almost imperceptible, except by very accurate dynamical tests, and may it not be that the difference would then be found to be in favor of the heavier machine? Without entering into any speculation upon the matter, we think that it was a fact apparent to every careful observer, that this light Ketchum machine actually required more power of draught, when in operation, than either of the four, and that the one which required the least power of draught was almost twice as heavy. So light indeed was it, that with the weight of the driver superadded, and driven at a rate of speed sufficient to cut the grass well,—which, by the way, is a little higher than that required by the other machines,—inequalities in the surface, even slight ones, caused it to bound in such a manner as to throw up the extreme end of the finger-bar several inches above its true cutting level, leaving the stubble uneven and wavy.

Allen's machine required less power of draught than the Ketchum machine. Its weight, with pole and whippletrees, is about 600 lbs. No machine that we have seen is so readily thrown in and out of gear as is this. It has a wooden, instead of an iron finger-bar. In our opinion an iron finger-bar is preferable. The weather cannot affect it, as of necessity it must a wooden one, and the grass which falls upon it leaves it a little more readily. Outside of the driving wheel is a light wheel which runs on a spring axle, and is claimed to be advantageous in turning and in working the machine upon a side hill.

The Manny machine also requires less power of draught than did the Ketchum machine. In this respect, the difference between it and the Allen machine was almost imperceptible. It has a wheel at the end of the knife-bar, which greatly assists in turning and backing, and makes it much more comfortable to transport from one field to another. We think that, other things being equal, a machine with a wheel at the end of the finger-bar has an advantage over a machine without it. Although

very different in construction, we regard the Allen and the Manny machines as very nearly alike in point of merit, and if it had so happened that it was necessary for us to decide between those two machines, our judgment would have been made up cautiously and with much hesitation, for each has points of excellence which the other does not possess. Both these machines did their work generally well, but not so well as the work done by the Heath machine.

This, like the Manny machine, has a wheel at the end of the finger-bar. Like that, too, it has a reel, which may or may not be used, as circumstances require. But its cutting arrangement differs entirely from either of the other machines. They each have a single knife, with the blades riveted to the plate, and operating through cast iron fingers or guards, which, especially when the knife is dull, may be liable to get filled up, and thus clog the blades. Instead of these, this machine has virtually a double set of cutters, the under set being stationary, projecting an inch beyond the upper, and thereby acting in the double capacity of guard *and* cutter. These, as well as the upper blades, are each independent of the other, and each attached to its bar by a screw bolt. The upper set of blades is held down by a spring pressure bar, so that the operation is similar to that of shears, the grass being cut between two sharp edges, and the machine working nearly as well at one rate of speed as another. In case of accident, therefore, a blade can be removed by any body and another substituted, in an instant of time. Both the upper and lower cutters are made like the best edge-tools in use, of the best cast-steel, with wrought iron backs. The iron furnishing strength, the steel can be made as hard as desirable, without so much danger of breaking by use, and being made hard, do not require to be so often ground. The lower cutter, or guard, as you may please to call it, is half an inch thick and one and one-fourth inches wide. The upper blades are about twice as thick as those used on any other machine. This machine very evidently required less power of draught than either of the others, and did its work the best. The Manny machine weighed about 600 lbs. This weighs about 850 lbs. In its cutting apparatus, which is, perhaps, the most important feature of a mowing machine, we regard it as *very much* superior to either of the others. In its ease of draught, perhaps the next most important

feature, we regard it as superior. We regard it also as less liable to clog than any machine with fingers or guards, like those of Ketchum, Manny and Allen. In other *important* features it is equal to the other machines.

We therefore unhesitatingly, confidently and unanimously, express the opinion, that the Heath machine, entered by D. C. Henderson, is entitled to the premium of one thousand dollars, if that premium is awarded the present year.

Moses Newell.
Thomas E. Payson.
Thomas W. Ward.

Boston, September 12, 1856.

ESSEX.

From the Report of the Committee.

The committee on farm implements have endeavored to awaken the attention of farmers to the importance of this subject. They regret to say they have not succeeded in this to the extent of their wishes. In some departments of labor great improvements have been made within a few years. In the structure of the plough, for instance, no man would now be willing to be seen trudging along behind such ploughs as were in use when he was young, with the furrow-slice poorly cut, and worse turned. In the mowing field it is a very short time since improvement of any kind has been attempted,—especially by the introduction of machinery, operated by horse or ox power. But so complete are the implements now in use for this purpose, and so readily is skill in their management acquired, that your committee feel confident the time is not far distant, when a perfectly constructed mowing machine will be deemed an indispensable implement on every well-conducted farm. We can remember when the thought of cutting grass by horse-power, except by the use of the jaws of the animal, would have been scouted as visionary and impracticable. But it has been demonstrated that one man, with a pair of medium sized horses properly trained, can cut an acre of grass per hour, and so continue to operate through the day, without unreasonable fatigue

to man or beast. A greater improvement than this has not come to the knowledge of your committee, in the operations necessary upon the farm. They feel they are promoting their own and their neighbor's benefit, in their endeavors to demonstrate this position.

Various forms of implements for this purpose, are now before the public. To discriminate between them is no easy duty, especially by the inexperienced. Your committee feel deeply their incompetency to the performance of this task. Their aim has been to test those implements best fitted to be used on New England farms,—where the surface is more or less uneven, by the variations of hill and dale; and where the difficulty of a complete removal of roots, stumps, and other impediments is constantly occurring.

But two of the many machines constructed for this purpose,—Manny's and Ketchum's, have been presented to your committee, the present season. Similar implements were before the committee of the last year; a premium of fifty dollars was then awarded for the work done by Manny's machine. The committee then hesitated to express a preference in the machines presented, both because of their inability to discriminate in the use of machinery so complicated; and because of their doubts whether these are the machines the farmer wants. As a premium was then awarded for the work done by Manny's machine, they have queried whether they should be justified in making a further award for work done by a like machine, without some decided improvement in the performance of the work. They have looked in vain for such improvement. They are not able to point out wherein Manny's machine is any better this year than it was the last. Nor are they prepared to say that it is to be preferred to Ketchum's. They think some implement more complete than either of these is still demanded; something that shall need less watching and less repairs.

The attention of the committee was called during the hay making season, in the month of July, to the operation of machines entered by Moses S. Little, of Newburyport, Manny's; Horace Ware, of Marblehead, Manny's; Eben G. Berry, of Danvers, Manny's; George B. Loring, of Salem, Ketchum's.

Messrs. Loring, Little and Ware, returned statements of their operations, showing the details of cutting more than fifty acres,

by each of the implements used. Mr. Berry made no return at all, and so far as the committee saw, performed nothing worthy of commendation with his machine.

The committee, anxious that exact justice should be done the several competitors, witnessed the operations of the implements, at such times and places as best suited the convenience of the applicants. It was made a condition precedent, that fifty acres, at least, should be cut during the season. The particulars of the cutting will be found in the statements hereunto appended.

The committee have no hesitation in saying that the work done by Mr. Little, on the farm of Mr. Newell, in West Newbury, was the most satisfactory they witnessed. Here one acre of grass, yielding one ton and a half of hay, was cut in forty minutes, and so evenly cut, that when the grass was cleared off the ground, it was not possible to discover in what direction the machine had moved, when standing only a few rods distant. To be sure, the land was in fine order for the experiment, as is every thing else about the Colonel's extended farm of more than two hundred acres, of as fine land as any in the county.

Upon a full view of all that they saw and learned on this subject, they are unanimous in the opinion that the work done by Mr. Little is entitled to preference; and they accordingly award to him the premium of fifty dollars.

The only funds at the disposal of the committee, were those given by Mr. Fay, with the express limitation, that "no award will be made for any agricultural implement which is not of the best workmanship, and of such a character as to commend it to the farmers of the county, by its superiority over implements now in use to accomplish the same purpose."

In behalf of the Committee,

J. W. Proctor.

November 17, 1856.

Statement of Moses S. Little.—Manny's Machine.

Date.	Acres.	Hours.	Accidents.	How repaired.	Miscellaneous Remarks.
June 30,	2	2	None.	– –	City of Newburyport.
July 1,	7	6	None.	– –	P. T. Winkley.
" 2,	3	2.30	None.	– –	Moses Pettingell.
" 3,	4	4	None.	– –	Dean Robinson, W. Newbury.
" 3,	1½	1	None.	– –	W. Morse, West Newbury.
" 7,	2½	2.30	Broke pile iron.	New one.	Mark Haskell, Newburyport.
" 8,	5	4	None.	– –	City of Newburyport.
" 10,	5	4	Broke cog wheel.	New one.	P. T. Winkley,
" 12,	3	3	None.	– –	City of Newburyport.
" 14,	8	7	Broke two fingers.	Put on by driver.	J. Hill.
" 15,	4¾	4	Broke cog wheel.	New one.	E. Knight.
" 15,	3	2.30	None.	– –	E. Knight.
" 16,	6	5	None.	– –	E. Knight.
" 17,	5	4.45	None.	– –	N. Strargers.
" 18,	1½	1	None.	– –	P. T. Winkley.
" 18,	3	2.30	None.	– –	E. Hale.
" 21,	5	5	None.	– –	P. T. Winkley.
" 22,	5	4.45	None.	– –	P. T. Winkley.
" 23,	5½	4	None.	– –	Edmund Little.
" 24,	1	.30	Broke lip on finger.	New one.	Col. Moses Newell.
" 24,	5	4.30	None.	– –	Col. Moses Newell.
" 25,	3	3	Two fingers broke.	Put on by driver.	Col. Moses Newell.
" 28,	8	7	None.	– –	P. T. Winkley.

Statement of George B. Loring.—Ketchum's Machine.

Date.	Acres.	Hours.	Accidents.	How repaired.	Miscellaneous Remarks.
July 4,	3	2.30	None.	– –	Grass two tons to the acre.
" 5,	2	2	Finger broke.	Replaced in field.	Growing very rough.
" 7,	2½	2.15	None.	– –	Grass one and a half tons to acre.
" 8,	2	1.45	None.	– –	Grass two tons to the acre.
" 10,	3	2.45	None.	– –	Fingers clogged and were replaced.
" 11,	2	1.45	None.	– –	Machine worked easily.
" 14,	3	2.45	None.	– –	Heavy lodged clover—cut well.
" 15,	2	1.40	None.	– –	Grass cut smoothly.
" 17,	4	3.45	None.	– –	Work done very well.
" 18,	2	1.40	Pin broke.	Replaced in field.	Heat intense—horses worked easily
" 21,	2	1.45	None.	– –	Weather cooler.
" 22,	3	2.30	None.	– –	Work done with ease.
" 24,	2	1.60	None.	– –	Ground rough—work well done.
" 25,	1½	1.15	Shackle broke.	Send to Boston.	Committee witnessed the work.
" 28,	3	2.45	None.	– –	Grass 2 tons to acre—ground rough
Aug. 11,	2	1.45	Finger broke.	Replaced at barn	Machine worked well.
" 18,	3	2.40	None.	– –	Work done with ease.
" 25,	4	3.50	None.	– –	Grass one and a half tons to acre.
" 26,	3	2.45	None.	– –	Grass light—work easy.
" 27,	4	3.45	None.	– –	Ground rough.
" 28,	5	4.30	None.	– –	Work done with ease.
Sept. 20,	4	3.40	None.	– –	Second crop cut.

Team, in both cases, two horses, of 2,000 lbs. weight.

In the commencement of the season, I provided myself with a new set of fingers upon the knife-bar, so constructed that each finger was riveted upon the bar on both sides. This arrangement, after several trials, proved to interfere with the working of the knives, and I was obliged to have the fingers cut off, so as to have an open space on the lower side of the bar. This remedied the evil; and as the fingers were well constructed, of good material, and good shape, I had no further trouble with them, even on rough and stony land.

The machine has answered all the purposes for which I purchased it. I experienced no difficulty in its operation, even where the grass was very heavy, and badly lodged, as was the case to a great degree in the abundant crop of the last season. No unevenness of land seemed to impede its progress. I had the stones carefully removed in the spring, and all ordinary unevenness, such as furrows and shallow ditches, did not interfere with the working of the machine.

The ground upon which my machine was operated, furnished a very severe test of its power. Most part of it is clayey, heavy soil, very wet in wet seasons and stiff and rough in dry ones. No special care has been taken in laying it down. And I am confident that no machine but the strongest, could endure the wear and tear to which it is subjected on such a surface.

No difficulty has been experienced in the varieties of grass which I have cut. The heaviest and the lightest have fallen equally well, and no trouble has been met in turning the corners or in driving the machine so as to avoid clogging.

The experience of this season has convinced me that on ordinary rough New England farms, the Ketchum machine works almost to perfection. I do not mean to say it has no equal, for I have not experience to warrant such a statement. But in all varieties of work, light grass and heavy, lodged clover and upright Timothy, rough land and smooth, I find that I can rely on its operation, without particular effort to secure for it any advantages. Its draught is no trouble to such horses as a farmer ought to own. And it does its work without any extra and ingenious appliances.

Of the economy of mowing machines, it seems to me there can be no question. I have found that the machine operated on the Pickman farm, would cut grass enough in four or five hours

in the morning to keep the laborers busy during the day, and as much as could be cured and got in with ease. The two seasons during which I have witnessed the working of the machine, I have made it in my mind an absolute necessity, in all economical management of the farm, to which purpose alone I have had it applied.

SALEM, November 1, 1856.

Statement of Horace Ware.—Manny's Machine.

Date.	Acres.	Hours.	Quantity.	Miscellaneous Remarks.
June 24,	1½	2	3 tons per acre.	Lodged.
" 30,	5	4½	2½ " "	Lodged clover.
July 1,	8	7	½ to 2 " "	– – –
" 2,	8	7½	1 to 2 " "	– – –
" 7,	10	10	to 3 " "	Badly lodged.
" 8,	6	4½	1 to 2 " "	– – –
" 9,	6	4	2 " "	Badly lodged.
" 10,	4	3½	1 to 3 " "	Badly lodged.
" 14,	4½	3½	1 to 2 " "	– – –
" 15,	1½	1	1 to 3 " "	Badly lodged.
" 16,	6	5½	3 " "	Broke connecting rod.
" 17,	5	3½	1 to 2 " "	– – –
" 18,	2	1½	1 " "	– – –
" 19,	5	4	2 " "	Broke cog-wheel.
" 21,	10	9	1 to 2 " "	Broke finger.
" 22,	7	7	1 to 2½ " "	Badly lodged.
" 23,	5	4	½ to 2 " "	– – –
" 25,	1½	1½	1 to 2 " "	– – –
Sept. 15,	4	2½	½ " "	Second crop.

In addition to the above, I have mowed about six acres of second crop in as many hours, of between one and two tons to the acre.

I entertain the same favorable opinion of Manny's machine, as compared with all others that I have seen, that I expressed last year; and recommend it with confidence to all who have the requisite skill and patience to use such an implement.

MARBLEHEAD, November 1, 1856.

HAMPSHIRE.

Report of the Committee.

This department of the mechanic arts presents claims of paramount importance. As a part of the exhibition, it may well excite admiration, improve the taste, gratify the pride and promote the material interests of an industrious people. Improved farm implements measure the progress of civilization. The scale of social elevation of nations, attained in England, France, the United States, and in India or Turkey, is indicated by the farm tools used in those countries. With the rude plough of half-civilized nations, the most skilful would fail to turn the furrow as we have seen it turned to-day, and all the noble oxen from Leverett could not stir the subsoil. In the construction of agricultural implements, inventive genius and enterprise have been tasked. What was once made by any one, who could use a saw or strike an anvil, is now made in large manfacturing establishments, with expensive machinery. The rapid succession of improvements has been truly astonishing. If the old patterns of hoes, shovels, manure and hay forks, fanning-mills, ploughs and wagons, spinning-wheels and looms, used a quarter of a century since, could be collected and shown at our annual fair, beside our improved implements, the exhibition would be amusing, as well as useful. Shall it be done at the next exhibition of the Hampshire Society? Some articles have been improved, and others entirely superseded by new inventions. The hand-cards, hand-looms and spinning-wheels have been safely stowed in the garret, unless perchance the rim of the latter be used to expand garments it once helped to fabricate. The sickle and flail give place to the reaper and the threshing machine. Mr. Stetson's mowing machine indicates that even the scythe may be numbered among the things which were. Mr. Stetson has an important improvement. It has not been thoroughly tested, but a trial of it during exhibition showed its decided superiority over a Ketchum's machine, which competed with it. It may have been in view of some such machine, that the Irishman asserted that the easiest work he ever did, was to see a Yankee mow.

The introduction of improved farm implements tends to emancipate men from the necessity of exhausting labor.

In view of the important interests centring in this department, your committee would like to have had more funds at their disposal, and to have awarded tens where we have given units. DAVID DEXTER.

HAMPDEN.

Report of the Committee.

The committee to whom was referred the subject of farming tools and grass seeds, submit the following report. Good tools and good farming will be likely to exist together. Farmers can ill afford to work themselves or have their help work with any thing else than good tools. While it may not be true that farming could not have reached its present stage of improvement without the use of modern implements, it is true that for scarcely any advantage are farmers more indebted than to inventive genius applied to the improvement of farming tools. George Crabbe, the English poet, speaks of one

> "Who lived in times, when not a man had seen
> Corn sown by a drill or threshed by a machine."

In those times men and women "paired off" on a pillion; ploughs had wooden mould-boards, and farmers heaped up their compost with a wooden shovel and winnowed their corn with a fan. But not so now. The good genius of improvement that has made the map of our country look like a vast gridiron with her iron pathways, and hung out her telegraphic wires "from pole to pole" across the land, has visited the farmer in his field and given him new and improved implements for every department of his trade, so that now we look on the old folks and old ploughs as we look upon the old spinning wheels of the garret. If we had strength enough to wield the clumsy implements of a hundred years ago, the "profit and loss" account would not justify it. Clumsiness itself can work better and faster with good tools than poor; and enough better and faster to pay for the best tools within reach.

With these views, we rejoice at every new implement offered

to farming. Whether it be to pare an apple or plant a field of corn, to saw wood or sow turnip seed, we rejoice in every offered improvement. Some will of course be cheats, some "notions," some will be badly constructed; but as better ploughs and better threshers and better corn-planters are offered, they will, as a thousand improved implements have already done, gradually win the field, and help on a blessed Sabbath day to tired and aching human hands.

The exhibition of tools this year was not great, but good. There were ploughs that would evidently cut and turn the sod like a surgeon's knife; there were machine mowers that were invented long since John Milton ventured his truthfulness on the assertion that

"The mower whets his scythe."

There were shovels, and forks, and hoes, and spades, as bright as the tools of the dentist; so that, familiar as we have become with improved implements, we were even surprised at their perfection. They would do every thing but convert digging into a pastime and make poetry of work.

That farmer is little better than an uninspired clod, who, among his other blessings, is not thankful for such good tools. We have heard of an old lady who brought out her medicinal herbs every spring, and gave thanks that she had not been obliged to use them. Might not the rational farmer as well bring out his tools, his ploughs, and pitchforks, and corn-planters, and the like, at least once a year, and give thanks that he has been permitted to use them.

Here we venture the thought that a good agricultural store, (such as we have,) is a real blessing to the whole farming community. It aids our acquaintance with the improvements of other parts, and thus helps us keep up with the age. If our farmers could have a reading-room connected with such a store, and hold occasional meetings for conversation and debate, it would leave little to be asked for. It would be an improvement certainly next to the new show-ground.

Your committee were also authorized to speak of any new ivention, offered to farming. One article of this description claims our notice: this is called the "Gang Cultivator," for softening land, covering seeds, guano and the like. It was put

to trial in the hands of the committee on the society's new lot. It worked admirably. It operates upon a space about five feet wide, and leaves the earth almost as light as if sifted down. Unlike the harrow, it pulverizes the soil as completely at the depth of four or five inches as on the surface. It must be worthy of all praise as a pulverizer and seed-coverer. Without something of this kind, we are persuaded that the farmers of Hampden county will not be willing long to do.

We should not forget to mention that two machine mowers were exhibited at the hall, one by William H. Hovey, of Springfield, the other by A. R. Allen, of New York. They added much to the interest of the show. Of the comparative merits of the two we cannot speak, not having seen them operate. Allen's machine has a long, and as it appears, a well established reputation. Hovey's machine is yet comparatively untried, but promises well. We recommend them both to favor.

W. C. Goldthwait, *Chairman.*

DAIRY STOCK

MASSACHUSETTS.

Report of the Committee to the Trustees of the Massachusetts Society for the Promotion of Agriculture.

The committee to whom was assigned the service of adjudging the premiums for dairy stock, under Classes No. 1 and No. 2 in the proposals offered by the trustees of the Massachusetts Society for the Promotion of Agriculture, have given that attention to the discharge of their commission, which the brief opportunity afforded for a personal examination of the animals exhibited in the pens, and a consideration of the not very precisely definite statements of the exhibitors, would permit. It must be obvious, that the first inquiry which would suggest itself to the minds of the members of the committee, would be, what is the standard of excellence,—or, in other words, what

constitutes the best dairy cow? At first view, the rules prescribed would seem to imply that the quantity of milk of each cow, ascertained for the first three days of each month of trial, and the amount of butter and cheese manufactured from all the milk, during the whole period of trial, might satisfy the object of the proposals. But this would be but a narrow construction of the purpose designed by the trustees. Nor, added to this, would the judgment of the committee upon the appearance of the animals, fulfil the scope of the inquiry. Whatever the product of the cow, or however symmetrical her proportions and apparent points of excellence, to the eye or the touch, there are other matters which enter largely into a proper consideration of the award of the proffered premiums. The true purpose of the exhibition was, not to make a show merely of fine animals, however gratifying this might be to the spectators, but by far the higher and more important end of eliciting information, and acquiring knowledge of well authenticated facts and results, which would instruct the community of practical farmers, and offer to them richer inducements to the improvement of their stock, than any transient success in a cattle show competition. It was this communication of the peculiar qualities of animals, best suited to the dairy,—of the preference to be given for these qualities, among the various races,—of the relative product of the different breeds,—of the expense of their keeping, and their docility under management,—and of the arrangement and conduct of the dairy, which were primarily sought; and unless these are furnished, in *substantial* compliance with the requisitions accompanying the proposals, the object for which alone the premiums were offered, and to which the hopes and labors of the trustees have been directed, has not been obtained. The money may, indeed, add to the rewards of a few well-managing and prosperous dairymen, but will do little for the community of farmers, who have looked to this occasion for a communication of knowledge and skill in a leading department of agricultural industry.

It is now more than a year since the trustees of the State Society, with munificent liberality, appropriated a sum exceeding two thousand dollars, for the encouragement of dairy stock, of which sum one thousand and fifty dollars were offered, in published proposals of premiums, for dairy cows, in two classes

of six and four animals respectively, to be exhibited at the annual cattle show of the Worcester County Society, the present year. The competition was made open to farmers from all parts of the State; and to equalize localities, as far as might be, liberal compensation for travel was provided for competitors, in proportion to their distances from the show. Four premiums were proposed in each class, varying in the first class, from $250, the highest, to $100, which was the lowest; and in the second class, from $150 to $40. It might have been expected that an amount of bounty so nearly corresponding with the value of the animals to be exhibited, and so richly remunerative of any care and labor in giving an account of their qualities, and their management and product for a single season, to say nothing of the incentives and influences of a public spirit, would have secured general attention, and attracted numerous competitors in the trial. The committee have to regret that such has not been the case. There are even fewer competitors than the number of premiums offered for distribution; and of these, with a single exception, all are from the county of Worcester. After the repeated efforts which, in years past, have been ineffectually made to obtain, by statement and exhibition, the means of comparison and preference between the dairy stock of different districts of the Commonwealth, and to gather reliable information of the product of dairies and the mode of their management, there is little to encourage a persistence in this mode of inquiry. But we may be comforted in the assurance, that the progress of improvement, though slow, will be certain to follow individual interest and enterprise, and trust to time, at last, for the fruits of experience and success.

The committee received from the secretary of the trustees, the written statements filed with him, pursuant to the requirement, of five persons claiming to be competitors for premiums, in the first class, and of two persons claiming to compete for premiums, in the second class. An analysis of these voluminous papers, and an exhibit of the material facts, in an abstract from the representations which they contain, will show how far the respective competitors have entitled themselves to consideration, and how far, to any useful purpose, they have satisfied public expectations and subserved the interest which they were called upon to advance.

Under Class 1.—"For the best six dairy cows, which have been owned and kept together from July 1, 1855, to the day of the show, and at least three of which cows shall have been bred and raised, or imported, by the competitors,"—

John Mann, of Worcester, entered, and presented his statement of the ownership and keeping of six cows, four of them being raised by himself. They were from a herd of 21 cows kept together, and their ages, respectively, 10, 5, 5, 9, 9, and 4, and their breed denominated "grade." Their product in milk, for the first three days in nine months, from December 1, to August 1, both inclusive, was 3,355 lbs. 4 oz., or 1,299 quarts 1 pint, which yielded 156 lbs. 4 oz. of butter. The whole produce of the nine months is not given, nor does it any where appear from Mr. Mann's statement, that, except for the first three days of each month, the milk was manufactured into butter or cheese, according to the requirement. In answer to the inquiry as to the process of manufacturing, he states: "That for the last eight years he had not made much butter, having sold the milk. The way he did, last winter, was to put three quarts in a pan and set it up stairs, where it would not freeze, till it was three days old. In the summer, the same in a pan, and put it down cellar, and let it set till it was sour." Mr. Mann fed to his stock of cows last winter, with his hay, 3,500 lbs. of shorts, at $25 per ton; 302 bushels of corn and cobmeal; 100 bushels of carrots; 50 bushels of turnips; and 50 bushels of small potatoes,—the meal being mixed with wet hay,—and after the 12th of February he gave swill once a day to those yielding the most milk, instead of meal on their hay. He keeps his cows in the barn through the night in summer. There is nothing otherwise peculiar in his management.

One of Mr. Mann's cows, 10 years old, gave, in the first three days of February, 49 quarts of strained milk; and the same quantity the first three days in June, according to his statement. His six cows yielded, on the first three days of June, 224 quarts of milk.

Samuel Ellsworth, of Barre, entered six cows, of eleven kept together, of the ages respectively of 9, 6, 7, 10, 3 and 3, grade Durham. Three of the six raised by himself.

In the first three days of the nine months of trial, they pro-

duced 2,948 lbs. of milk, or 1,165 quarts 1½ pint, yielding 105 lbs. 14 oz. of butter, and 138 lbs. 8 oz. cheese. The whole product of the season was—butter, 772 lbs.; new milk cheese, 1,251¾ lbs.; skim milk, 580½ lbs. Mr. Ellsworth gives the following as his process of manufacture: "My manner of making butter is to set the milk in tin pans, about half full, in a warm room, in winter, with good air; let the milk stand about forty-eight hours, then take off the cream, put in stone jars with a little salt, and stir thoroughly every day until churned. After churning, draw off the buttermilk and wash in two waters, then salt to the taste; let it stand twenty-four hours, then worked by hand and put in stone jars, and cover it closely from the air. In the summer, the milk is set in a cool place, the cream in stone jars in the cellar, and the butter made in the same manner as above."

The extraordinary yield of Mr. Ellsworth's cows, considering the ages of two of them, and the length of time in which others had been in milk, will justify giving his full account of their keeping. "From November 15 to May 15, the cows were kept in the stable, except when turned out to water. Their food was English hay and straw mixed, also corn fodder through the month of December. Extra hay, a peck of English turnips each, January. English hay and half peck of carrots each, February. Hay and half peck of potatoes each, until the 15th of March; then one quart dry Indian meal per day to each cow, with half peck of potatoes; then the same quantity of meal, with cut hay wet, to the time of turning to pasture, and no extra feed after. The cows were turned to after feed of the mowing about August 10th. No extra feed while in the pasture."

The largest yield of milk by either of Mr. Ellsworth's cows, for the first three days of any month, was in July, by "Cream-pot," 6 years old, one-fourth Durham—55 quarts 1½ pint—and the greatest quantity given by his six cows in the first three days of either month, was 224 quarts in August.

Asa G. Sheldon, of Wilmington, entered six cows, of the respective ages of 4, 4, 5, 6, 7, and 10 years, kept together in a herd of eight, all native but one, and that one native, with a cross of Durham—three of them raised by himself.

Mr. Sheldon gives the product as follows:—

For the first three days of the nine months from December 1, 2,230 lbs. 2 oz., or 927 quarts 1 pint of milk, yielding 134 lbs. 15 oz. butter. The whole product of the season, to September 1, was 983 lbs. of butter, 215¼ lbs. of which, manufactured from the 1st of December to the 1st of June, he sold at 25 cts., and the residue, from June 1, at 30 cts per lb. Of the process of manufacture, he gives but a meagre and wholly uninstructive account, confined to the simple statement, that "the milk was strained into tin pans, set in a room above ground, and the dates of the several churnings," (which he gave in a table,) "showing how long the milk was kept." On recurring to this table, it appeared that the churning in June was, on an average, about once in three days; in July and August, once in about two days, and in the cooler months much less frequently. It might well have been expected from a competitor, whose whole product of the dairy was in the manufacture of butter for the market, at high prices, that his mode of preparing the milk and cream, selecting and preserving his dairy utensils and vessels, process of churning and working the butter, and the economy of his dairy room, would afford much useful direction to the good management of others, and if his answer may be considered as satisfying the *letter* of the interrogatory in the proposals, it may be truly said, that it is, at best, but a poor compliance with the *spirit* and *object* of the inquiry. In regard to the manner of keeping the stock, Mr. Sheldon is more explicit. He states, that his cows were turned into a back pasture as early as the middle of April, and into a good pasture the first of June. Since he commenced digging potatoes for the market, they have eaten the small ones, when he had them to spare, and when not, they have had green corn fodder. From October to May, their food was principally meadow hay, with husks and stalks, and one peck of turnips or carrots per day, to each cow, until they were all used. After this, they were fed with meadow hay cut, and fine feed mixed with sweetened water, each cow being allowed three pounds of fine feed and half a pint of molasses per day; while they were in the back pasture in the spring, they had the same allowance.

The greatest quantity of milk from either of Mr. Sheldon's cows, in the three first days of either month of trial, was 49

quarts, in June, by a native cow, five years old; and the greatest quantity by the six cows, in the first three days of either month, was 248 quarts and half a pint, in July.

William Robinson, Jr., of Barre, entered six cows, of a dairy of eighteen kept together, (four raised by himself,) of the ages of 10, 5, 7, 8, 8, 8, respectively; grade Durham. Their product, in the first three days of the nine months of trial, was 3,292 lbs., or 1,462 quarts of milk, made into 311 lbs. of cheese. The product of the whole season of trial was, 21 lbs. of butter and 2,954 lbs. of cheese.

Mr. Robinson gives the following very brief and unsatisfactory account of his mode of manufacture: "In summer, we run up milk twice a day, and then keep our curd one day, and manufacture it into cheese. In winter, we run our milk until we get enough for a cheese, and then warm the milk and stir in the cream, and make it into cheese the same day."

Of his treatment of his stock, and their keeping, he states, that his cows were turned to pasture May 4, and fed on hay morning and evening until the 11th, and afterwards had nothing but pasture feed, except corn fodder eight days, the last of August. From December 1, they were kept on corn fodder, straw and poor hay, until the first of March, then each had good hay, and two quarts ears of corn and oats ground together, per day, until the 11th of May."

William W. Watson, of Princeton, presented his claims for six cows, of ten kept together; ages 12, 11, 9, 7, 6, and 5 years. One Durham, two one-half Durham and one-half Ayrshire, one one-half Durham and one-half native, and two one-half Durham and one-half Holderness.

Of the product of these six cows, Mr. Watson gives no detailed account, except for the first three days of the months of June, July, and August, of which he states the yield to be 1,655 lbs. 4 oz., or 831 quarts 1½ pint of milk, making 199 lbs. 11 oz. of cheese. The whole amount manufactured during the prescribed period of trial, from December 1, to August 31, both inclusive, he sets down at 2,031 lbs. 11 oz. of cheese.

Of the process of manufacture, in answer to the interrogatory, his statement is only in these words: "Set the milk as soon

as milked, at sunrise and sundown—make cheese night and morning."

Of the manner of keeping his stock, he answers, that they "were turned to pasture May 25, 1856, had good pasturing, and were driven a mile night and morning. They were stabled from November 15, 1855, to May 25. Food, first month, wheat straw and husks; second and third months, wheat straw and husks, with hay once a day; fourth, fifth and sixth months, half English and half meadow hay; drink, water; calving time, two quarts of meal a day for one week."

The greatest yield of milk by either of Mr. Watson's cows, for the first three days of either of the months, of which he gives an account, was 52 qts. in July, by his half Durham and half native cow, 6 years old. The greatest quantity of his six cows in the first three days of either month, was 285 quarts $1\frac{1}{2}$ pint, in June.

Mr. Watson has neglected to state any account of the quantity of milk by his six cows, or either of them, on first three days of the first six months of the prescribed period of trial. Nor does it appear that three, at least, or how many, of the cows were bred and raised by himself; nor is the statement, filed by him, (such as it is,) either subscribed or sworn to, in conformity with the requirement.

Under Class 2.—"For the best four dairy cows, owned and kept from July 1, 1855, to the day of the show, at least one of which shall have been bred and raised, or imported, by the competitors," there were but two entries, with statements in writing filed with the secretary, according to the proposals.

Amos F. Knight, of West Boylston, entered four cows, of which he gave the following statement: That their ages, respectively, were 18, 12, 11, and 4 years—two of them of the native breed; one, one-half Devon, and one, one-half Aryshire, and that one of them was bred by himself. They were kept together with three other cows and two two-year old heifers.

The product of milk of these four cows, for the first three days of each month of trial, from December 1, 1855, to September 1, 1856, both inclusive, had been 1,583 lbs. 10 oz., or 634 quarts, which, made into butter, gave 57 lbs. 3 oz.

The whole product, for the entire period of trial, was 645 lbs. and 1 oz. of butter.

His cows were turned to pasture May 12, during the day, and fed from the barn morning and night, until the 20th, after which they were kept on grass only, except that since the 8th of August they have had corn fodder once a day. His practice is to keep his cows in the stable every night through the year; and while fed from the barn, they are foddered twice in the morning, once at noon, and twice at night—watered morning and night, and left out only long enough to drink, unless the weather is warm. From the first of March they are carded once a day. Of food, other than hay, he fed to his stock, while in the stable, subsequent to December 1, 1855—8 bushels of pumpkins, 80 lbs. of oil cake, 24½ bushels of English turnips, 410 lbs. of shorts, 69 bushels of carrots and 5½ bushels of cob and corn meal. Each cow had one peck of turnips or carrots per day, in the morning, and the shorts and meal were fed on cut hay.

In reference to the process of manufacture, Mr. Knight states, that "after the milk is drawn from the cows, which is done about sunrise in the morning, and at five o'clock in the afternoon, during the summer, it is carried to the milk room or cellar and strained into tin pans, from two quarts to three quarts to a pan. The time the milk stands before skimming, varies with the weather, generally from 36 to 48 hours. In the warmest weather, the creampots are set on the ice the night before we churn. We churn twice a week. When the butter is taken from the churn, the buttermilk worked out as clear as it can be and salted, it is set away for 24 hours, when it is worked over, and set away for 24 hours more. It is then worked over again, weighed into pound balls and lumped for the market. We generally sell our milk in the winter. I have 30 cents per lb. for my butter, through the season." Mr. Knight notes that his best cow did not do well in calving, grew afterwards poor, and for a while gave but little milk. It will be observed, also, that another was 18 years old.

The greatest yield of milk of either one cow, on any three of the first days of the month, was 41 quarts 1½ pint, by a native cow, 12 years old. The greatest yield by the four cows, on the first three days of any month, was 147 quarts 1½ pint, in June.

William Robinson, Jr., of Barre, entered also in the second class, four cows, of a dairy of eighteen kept together, their breed

grade Durham, all raised by himself, and the ages of three of them stated as 7, 8, and 10 years, respectively.

The account of their product is as follows, viz. :—

For the first three days of each month of trial, 1,948 lbs., or 859 quarts $1\frac{1}{4}$ pint of milk, which manufactured, gave 4 lbs. 12 oz. of butter, and 182 lbs. of cheese. The product of the manufactured milk of all the cows, for the whole time, was 42 lbs. of butter, and 1,559 lbs. of cheese.

The cows were turned to pasture May 4, and fed on hay morning and evening, until May 11, and after had nothing but pasture feed, except corn fodder the last eight days in August. In winter, subsequent to December 1, 1855, they were kept on corn fodder, straw, and poor hay, until the first of March, 1856, and then had good hay, with two quarts of meal, made from ears of corn and oats ground together, fed to each cow per day, to the 11th of March.

Mr. Robinson's reply to the interrogatory—"What is your process of manufacturing in summer and in winter, specifying the difference, if any, in the manner of keeping the milk and cream, the frequency of manufacture, the course of management in all its stages?" is, (as was his answer to the same interrogatory under his entry in class 1, proposed alike to all the competitors,) "In summer, we run up the milk twice a day, keep our curd one day, and manufacture it into cheese. In winter, we keep our milk until we get enough for a cheese, then warm the milk and stir in the cream and make it into cheese, the same day."

The greatest yield of milk of either one of Mr. Robinson's four cows, for the first three days of any month, was 59 quarts and $\frac{1}{2}$ pint, in June, and the largest yield of the four cows, for the three first days of any month, was 206 quarts and 1 pint, in July.

The committee have thus gone through with a careful analysis and abstract from all the statements made by the respective competitors. They have endeavored to do full justice to their representations in all material respects, giving them in the very words, or deducing the results from the figures of the claimants themselves. There has been a noticeable neglect, on the part of some of them, to answer with explicitness, many of the

inquiries propounded in the forms for the returns. In respect to the period for which the cows were dry, for instance, while some have set down the dates of their becoming dry, and of their subsequent calving, others have given but a single date, as December 1, or the last of January, when all their cows were dried; while others, without dates, have stated the length of time in which their cows were not in milk. From such data, so far as the committee could form an opinion, it appears, that the average period in which the cows were out of milk, has been about two months, and on recurring, in this connection, to the mode of feeding, it is made obvious as a general truth, that the best kept animals go dry the shortest time.

As to "grooming" the cattle, which was made a subject of inquiry by the trustees, we have nothing in reply. The use of the card, the curry-comb and the brush, is not even mentioned, except by Mr. Knight, who only states, that "from the 1st of March, his cows were carded once a day." Nor is any thing said of litter for the cows in the stalls, that they may lie at their ease, and be kept dry and clean. Now the committee believe that there may be a judicious and profitable application of the card and curry-comb and brush, daily, and as to littering cows in the stable, if there were dairy maids in the land as there once were, and they did the milking as was done in the good olden times of domestic industry and frugality, the practice could not be neglected. In other particulars, the interrogatories are either entirely disregarded or the answers are so general and vague as to convey but little information. In these respects the committee cannot but lament, that the proffered liberality of the trustees has been so fruitless of anticipated results, and that the exhibition, with all that has been attractive in the appearance of the stock, will still leave us without that instruction which would direct to its most profitable selection and use.

But however barren and unsatisfactory may have been the written communications of the competitors, the exhibition of these animals in the pens has not been without its gratifications. The cattle have spoken better things for themselves than the credit given them by the written statements of their owners. In general, the cows were noble looking creatures, showing much beauty of form, good size, and the best points in milking qualities. Mr. Ellsworth's six Durham grade cows were espe-

cially noticeable for their size and imposing appearance. His two heifers, three years old, in the judgment of the committee, are quite as promising as any which were exhibited, and all bore evidence of good care and judicious breeding. Mr. Robinson's cows, though showing good points, were inferior, both in size and condition, to those of Mr. Ellsworth, but they gave, strongly, the mark of the Durham blood. The cows of Mr. Sheldon, all of native stock but one, and that of the Durham race, had excellent milking points, and considering they had been driven more than fifty miles to the show, while in full milk, were in excellent condition. Mr. Knights' cows, two of native breed, one a cross with the Devons and another with the Durhams, shew their good points very favorably, but the old cow of eighteen years, by his own admission, had been kept at least one year too long, and was thin in flesh and obviously failing.

Mr. Mann's cows, from a herd of twenty-one kept together, did not escape the particular notice of the committee. In blood, they were represented as "grade," and they bore evident marks of the cross of the native with the shorthorns. Some of them had admirable milking points, and certainly all did credit, in their condition and appearance, to the generous keeping they received, according to the statement of their owner, especially during the preceding winter.

Upon applying the prescribed rules to the statements of the several competitors, in Class No. 1, the committee are unanimously of opinion, that Mr. Mann has not maintained his claim to competition. He has given no account of the manufacture of his milk, except for the first three days of each month, nor of the whole yield of milk, either manfactured or unmanfactured. The rule is explicit and imperative, that, in Classes No. 1 and No. 2, "all the milk must be manufactured into butter and cheese, during the whole period of trial," and without this compliance on his part, there could be no just comparison and decision between the productiveness, qualities and value of his cows, and the cows of other competitors. In the absence of the account, the presumption is, that, except in one part of the required trial, that of the product of the first three days of the months, the milk was neither manufactured, nor the quantity noted, but that, as he states to have been his practice for past

years, it was sold in the market. This neglect of Mr. Mann to keep an account is the more to be regretted, inasmuch as the trial, so far as he proceeded, shows a better result than that of either other competitor. It would have been important also, upon another point of inquiry, how far the expense of high keeping found a corresponding recompense in the greater productiveness of milk made into butter or cheese, Mr. Mann having fed his stock far more richly, as will be seen by his statement, than any other competitor.

For a like reason of non-compliance with the rules, and in much more considerable and material respects, the claims of Mr. Watson must have been excluded from competition for the premiums. He had rendered no account of the product of his cows previous to June, 1856, altogether omitting in his statement their yield for any part of the preceding six months of the period of trial. His cows were not seen in the pens, and it was understood that he withdrew from the competition.

The claims to premiums in Class No. 1 are thus reduced to three competitors, and the committee find, upon examination and comparison of results, that between them, the cows of Mr. Ellsworth were altogether the most productive. By his statement, it appears that he manufactured from the milk of his six cows, during the whole period of trial, 772 lbs. of butter, and 1,251¾ lbs. of cheese. Charging the butter at 30 cents per lb., would give $231.60 ; and the cheese at 10 cents per lb., $125.17 —making an aggregate value of $356.77. Or estimating the produce of milk in butter as equal in quantity to three times the same weight in cheese, adding to this the quantity of cheese actually made, and so stating the account, would give an equivalent to 356 lbs. of cheese, and the same pecuniary result. This sum, as will be perceived by tables which the committee have prepared to accompany this report, exceeds, by more than fifty dollars, the value of the product of any other competitor. Added to this, Mr. Ellsworth gives an account of 540½ lbs. of skim-milk cheese, manufactured during the same period, which the committee have not taken into the estimate, as it may fairly be offset against the whey or buttermilk of other competitors, of which no account is required.

As between Mr. Ellsworth and Mr. Robinson, one of his competitors, it should be remarked, that the yield of milk by the

cows of the latter, in the first three days of the month of trial, was greater, both in weight and quantity, than that produced by the cows of the former; but the manufactured product, stated in the equivalent of cheese, was by 550 lbs. less. Whether this was owing to the richer quality of the milk of Mr. Ellsworth's cows, or his more perfect process of manufacture, the committee have no means to decide. His cows were somewhat better fed in the winter, but two of them were only three years old, while all of Mr. Robinson's were of mature age. The cows of both were of the same breed, grade Durham.

The committee unanimously adjudge to Samuel Ellsworth, of Barre, for the best six dairy cows, the first premium of $250.

To Asa G. Sheldon, of Wilmington, for his six cows, the committee adjudge the second premium of $200.

As between Mr. Sheldon and his competitor Mr. Robinson, the committee find from their statements, respectively, that Mr. Robinson's cows, for the first three days of each month of trial, yielded in the aggregate 3,292 lbs. 4 oz., or 1,462 quarts of milk, to 2,230 lbs. 2 oz., or 927 quarts 1 pint of Mr. Sheldon's. But the lesser weight and quantity of milk of Mr. Sheldon's cows produced 134 lbs. 15 oz. of butter, equal to 402 lbs. 13 oz. of cheese, to 311 lbs. of cheese actually manufactured from the milk of Mr. Robinson's cows. The whole value of the product in butter, for the entire period of trial, of Mr. Sheldon's cows, at 30 cents per pound, is $294.90; and that of 21 pounds of butter, equal to 63 lbs. of cheese, added to 2,954 lbs. of cheese, manufactured in the same period from the milk of Mr. Robinson's cows, at 10 cents per lb., gives $301.07. Two of Mr. Sheldon's cows, however, were but four years old, while three of Mr. Robinson's were eight; the ages of the residue of both competitors comparing well with each other. It will be seen, that the advantage here was greatly on the side of Mr. Robinson. Mr. Sheldon's cows were better fed than Mr. Robinson's, during the winter; but, in the judgment of the committee, this will not sufficiently account for the greater richness of their milk, as shown in the product of butter. Besides, it is found, by recurrence to the tabular monthly statements of both competitors, that the greater disproportion in the manufactured product to the yield of milk, was in the summer season, while the cattle were at pasture.

For the reason assigned, in the case of Mr. Ellsworth, no allowance is made by the committee for the buttermilk set down by Mr. Sheldon as sold by him for $90; nor of two fat calves, at $19.50, as there are no returns, under the prescribed rules, from other competitors, by which a comparison of other products than milk manufactured into butter and cheese could be made. Besides, it is not stated in what manner the calves were fattened. Other competitors raised their calves, and doubtless all had whey or buttermilk from the dairy in proportion to their manufactured milk.

It is proper to note, that Mr. Sheldon ingenuously stated, that one of his cows had been hired out, before he knew of the proposals, from July to November, 1855, but in the mean time was owned by him, and had been returned and kept with the others during the whole period of trial. The committee are unanimously of opinion, that this circumstance should not operate as a forfeiture of his claims, the spirit of the rule in relation thereto evidently intending only to restrain the procurement of cows after the proposals were issued, with the express purpose of successful competition for a premium. This cow was kept with the rest, and subjected with them to all the required tests of product.

It remains to the committee to assign to William Robinson, Jr., of Barre, for his six cows, the third premium of $150.

In Class 2.—For the best dairy cows, the committee, as between Mr. Robinson and Mr. Knight, could have little question of precedence. Mr. Robinson's cows, for the first three days of the months of trial, gave an aggregate of 1,948 lbs. of milk, or 859 quarts 1½ pint, producing 4 lbs. 12 oz. of butter, equal to 13 lbs. 8 oz. of cheese, which with 182 lbs. of manufactured cheese, makes 195 lbs. 8 oz., against 1,583 lbs. 10 oz., or 634 quarts 1 pint of milk, manufactured into 57 lbs. 3 oz. of butter, equal to 171 lbs. 9 oz. of cheese, the product of Mr. Knight's cows. But the entire value of the product of Mr. Robinson's cows, for the whole period of trial, was but $168.50, to $193.50 from the cows of Mr. Knight. Now the prize offered is for the best dairy cows, and not for the cows which may give the most milk; and surely those must be best which yield the greatest dairy product, in proportion to their milk, in butter

and cheese. The cows of Mr. Knight appear to have been better kept, especially in the winter, than those of Mr. Robinson, and his herd was not so numerous; but these considerations do not outweigh the advantage which the latter had in the better ages of his animals, and the great disproportion in the value of their dairy product.

The committee adjudge, in Class 2, to Amos F. Knight, of West Boylston, for the four best cows, the first premium of $150; and to William Robinson, Jr., of Barre, the second premium of $100.

The committee paid little regard to the consideration of allowance, suggested by Mr. Knight, that one of his cows was 18 years old. They cannot approve of the keeping of cows to that advanced age, for, under no circumstances, can it be economical. With rare exceptional cases, they should not be continued in the dairy beyond the age of 12 years.

The credit is due to Mr. Knight for having given the *best* of the imperfect accounts of the process of the manufacture of butter.

The comparisons before stated of the yield of milk, and products of its manufacture into butter and cheese, from the cows of Mr. Ellsworth, Mr. Robinson and Mr. Sheldon, in Class 1, and from the cows of Mr. Robinson and Mr. Knight in Class 2, present, in a striking point of view, the interesting and much vexed questions, whether some cows or races of cows, do not possess peculiar qualities for the product of butter or of cheese, and not alike for both; and what are the points of discrimination, and the distinguishing characteristics of breed or blood for either?

With the permission of the trustees, the committee would recommend, in consideration that Mr. Mann pursued the tests of the products of his cows, and rendered statements of the results for a part of the season of trial, and has incurred expense and the loss of the use of these cows for several days, in bringing them to the show, and that his cows are really fine animals, adding much to the interest of the exhibition, there should be given to Mr. Mann a gratuity of twenty-five dollars.

In conclusion of this already too extended report, the committee cannot deny to themselves the gratification of offering

their congratulations, and expressing their warmest thanks to the trustees of the Massachusetts Society, for the beautiful display of dairy stock, of all classes, which their enlightened liberality has brought to the field of exhibition. So fine and valuable animals in this department of rural economy, and of ownership in this Commonwealth, it is believed, have not before been witnessed at any of our shows. They have here been seen by thousands of admiring spectators, and their worth will be made better known to a great body of practical agriculturists. If past efforts to obtain written statements of the properties and value of good stock have proved, to a great degree, unavailing, such opportunities will speak more impressively to the pride and interest of the farmer, and ultimately secure its more general possession and diffusion.*

The committee submit, with the report, the written statements of all the competitors, which, however, from the repetition and complexity of the questions and answers, can serve only for reference.

For, and in behalf, and by order of the committee,

LEVI LINCOLN, *Chairman.*

AGRICULTURAL HALL, WORCESTER,
September 26, 1856.

* The indefiniteness and meagreness of the statements of the various competitors for the premiums of the Massachusetts Society, are regretted, not only by the Committee, but by all who read and study them for the purpose of obtaining knowledge and skill in the matters to which they relate. It is very desirable that all persons making entries to the different agricultural societies of the Commonwealth, should be informed, that in awarding the premiums offered, the Committees will be governed by the rules pertaining thereto. These are definite, and easily understood. The statements should embody all the facts coming under the notice of the producer of the article offered for premium. These may seem too trivial to be noted by the experienced farmer, or amateur. Not so to the inexperienced, or the beginner. To such, they are the elements of that art whose thorough knowledge comprises an understanding of the practical economy of good husbandry. Hence the importance of full and accurate statements.—ED.

TABLE OF PRODUCT.

Class 1.—Six Cows.	Product of Milk—First three days in every month.		Manufactured into Butter.		Manufactured into Cheese.		Greatest quantity of milk from all the cows in 3 days.			Greatest quantity of milk from one cow in 3 days.		Whole product of Butter and Cheese from all the cows through the trial. Butter.		Cheese.	
	LBS.	OZ.	QTS.	PTS.	LBS.	OZ.	LBS.	OZ.	QTS.	PTS.		QTS.	PTS.	LBS.	OZ.	LBS.	OZ.
John Mann,	3,354	8	1,399	1	136	4	–	–	224		in June.	49		in Feb. & June By Fanny, 9 yrs. Grade.	No return.				
Samuel Ellsworth,	2,298		1,165	1½	105	12	138	8	224		in August.	55	1½	in July. By Creampot, 6 y. ¼ Durham.	772	–	1,251	12
Asa G. Sheldon,	2,230	2	927	1	134	15	–	–	248	1	in July.	49		in June. Native. 5 years.	933	–	–	–
William Robinson, Jr.,	3,292	4	1,462		–	–	311	–	360	1½	in June.	63	1½	in June. No. 1, 10 years. Grade—Durham.	21	–	2,954	–
William W. Watson,	3 days in June, 561.8 3 " July, 571.4 3 " August, 522		1,654	12	285.1½ 285.1 261.1		832	1½	–	–	68.6 68.8 68.2	199	–	285	1½	in June.	52	¼	in July. No. 1, 6 years. ½ Nat. & ½ Dur'm.	–	–	2,031	–
Class 2.—Four Cows.																			
Amos F. Knight,	1,583	10	634	1	57	3	–	–	147	1½	in June.	41	¼	in June. No. 2, 12 years. Native.	645	1	–	–
William Robinson, Jr.,	1,948		859	1½	4	12	182	–	206	1	in July.	59	¼	in June. No. 7, 8 years. Grade—Durham.	42	–	1,559	–

Note.—Mr. Ellsworth, in addition to his butter and cheese, stated in the foregoing Table, rendered an account of 580½ lbs. of skim-milk cheese, which the Committee have not regarded in their estimate of the product, as it may be fairly set off against the whey and buttermilk of other competitors, of which no account is required.

For the same reason, in the comparison of product, the Committee have not taken into their estimate the statement of Mr. Sheldon, of two fattened calves, sold by him for $19.50, and buttermilk sold for $90. As he gives no account of the manner in which the calves were fattened, and as to the buttermilk, other competitors may have had an equivalent, of which no account is given.

TABLE OF PRODUCT.

Class 1.—Six Cows.	Estimated Value for the whole period of trial.		Product in Butter and Cheese, reduced to the equivalent in Cheese, at the rate of 1 lb. of Butter to 3 lbs. of Cheese, and the account of product would then stand thus.	
John Mann,	No return for the whole period of trial.			
Samuel Ellsworth,	Butter, 772 lbs. at 30 cts., is $231 60 Cheese, 1,251 10 cts., is 125 17	$356 77	772 lbs. of Butter, equal to 2,316 lbs. Cheese. Manufactured Cheese, 1,251 Total, 3,567 lbs. Cheese, at 10 cts.,	$356 70
Asa G. Sheldon,	Butter, 983 lbs., at 30 cts., is	294 90	983 lbs. of Butter, equal to 2,947 lbs. Cheese, at 10 cts.,	294 90
William Robinson, Jr.,	Butter, 21 lbs., at 30 cts., is $6 30 Cheese, 2,954 at 10 cts., is 295 40	301 70	21 lbs. of Butter, equal to 63 lbs. Cheese. Manufactured Cheese, 2,954 lbs. Total, 3,017 lbs. Cheese, at 10 cts.,	301 70
William W. Watson,	Cheese, 2,031 lbs. 10 oz., at 10 cts., is	203 16	2,031 lbs. Cheese,	203 16
Class 2.—Four Cows.				
Amos F. Knight,	Butter, 645 lbs. 1 oz., at 30 cts., is	193 50	645 lbs. 1 oz of Butter equal to 1,935 lbs. 3 oz. Cheese,	193 50
William Robinson, Jr.,	Butter, 42 lbs., at 30 cts, is $12 60 Cheese, 1,559 at 10 cts., is 155 90	168 50	42 lbs. Butter equal to 126 lbs. Cheese. Manufactured Cheese, 1,559 lbs. Total, 1,685 lbs. Cheese, at 10 cts.,	168 50

Report of the Committee on Class No. 4.

There were but two entries in this Class. William W. Watson, of Princeton, exhibited a small native cow ten years old, which, according to his statement, yielded as follows:—

	lbs.	oz.
The three first days of March, (Butter) . .	4	8
" " " April, ...	5	8
" " " May, ...	5	12
" " " June, ...	6	0
" " " July, ...	6	0
" " " August, ...	5	12
Whole amount of butter in 18 days, . . .	33	8

Another cow, Devon and Durham, entered by William Eames, of Worcester, produced of butter:—

	lbs.	oz.
The first three days of March, ...	2	12
" " " April, ...	3	8
" " " May, ...	4	10
" " " June, ...	5	4
" " " July, ...	4	12
" " " August, ...	4	4
Whole amount of butter in 18 days, . . .	25	2

Neither of these competitors having complied with the conditions upon which these premiums were offered, from a misunderstanding of the terms of the same, the committee recommend a gratuity to William W. Watson, of $30, and to William Eames, of $20.

Mr. Salisbury, of Worcester, presented for exhibition beautiful specimens of the Alderney stock, as well as a number of fine grade heifers, which gave proof of care and attention in rearing.

T. P. Huntington, *Chairman.*

Report of the Committee on Class No. 5.

There was but one cow kept for milk, entered in this Class for premium, and she was so superior that the committee had no hesitation in awarding to her owner, Mr. Rufus Carter, of Worcester, the first premium of $40.

There were two other animals entered for exhibition only, the conditions of the premium not having been complied with. One of these, a fine cow entered by T. P. Curtis, the other a beautiful heifer, entered by Mr. Charles Brigham, of Marlboro'. The committee respectfully recommend that a gratuity of $10 dollars be allowed to Mr. Brigham, as some compensation for his trouble.

Charles L. Flint, *Chairman.*

From the Statement of Rufus Carter.

The record of the product of dairy stock, entered and exhibited for premium in Class 5, at the dairy stock exhibition, held at Worcester, by the Massachusetts Society for Promoting Agriculture, in the month of September.

The amount of strained milk yielded by the cow, for four months, beginning with May, is as follows:—

Yield of strained milk for			May,	656	quarts—	1,652 lbs.
"	"	"	June,	754	"	1,898 "
"	"	"	July,	660	"	1,660 "
"	"	"	August,	583	"	1,467 "
Total,	"	"	4 months,	2,653	"	6,677 "
Average daily yield for 4 months,				$21\frac{79}{123}$	"	$54\frac{25}{123}$ "

I have three cows, and the one I enter has been kept alone most of the time at pasture, and with the others while in the barn. The cow exhibited is ten years old, one-fourth Ayrshire and three-fourths Durham; and bred in Worcester, by Levi Lincoln, and raised by William S. Lincoln.

I commenced drying her on the 2d of March, and was obliged to milk her occasionally until the 28th of March. She dropped her calf on the 28th of April, 1856, and received the bull on the 15th of August. She was turned to pasture on the 3d of May.

My time of stabling extends from about the middle of November to the first of May, but my cows are kept in the barn a much longer time nights. While stabled, they are fed regularly three times a day, and allowed to drink three times a day,—groomed daily. The cow I enter was kept tied up in the barn most of the time during the last winter. She was exercised by driving her about one-fourth of a mile daily for a few weeks before she calved.

She was fed per day, during December, with 50 lbs. of mangel wurzel; 40 lbs. of the same from January 1st to 22d; then 36 lbs. carrots per day to February 21; 4 quarts of shorts on the 22d of February; 12 lbs. of carrots April 7th, and one peck of potatoes on the 24th day of April. While in the barn nights, she was allowed to eat what hay she pleased, which averaged from four to five pounds per night.

Note.—In Classes Nos. 1, 2, 3, 4, all the milk must be manufactured into butter or cheese, during the whole period of trial. In Class 5, the milk was not required to be thus manufactured.

Report of the Committee on Durhams.

There were no competitors for the premiums offered for Durham cows under Class No. 3, so that in reference to that class your committee had no duty to perform.

For the premiums offered for Durham bulls, under Class No. 6, there were five competitors.

Kirkleavington, entered by Paoli Lathrop, of South Hadley Falls, six years old the first of January last, we regard as a very superior animal, and a most excellent specimen of the Durham short horn breed.

We unhesitatingly recommend that the premium of $50, for the best Durham bull, not less than one year old, be awarded to Mr. Lathrop.

In our opinion neither of the other bulls, entered as Durhams, were of pure blood. Their owners failed to furnish pedigrees, or any other evidence, except their own suppositions, to induce us to change that opinion.

The bull entered by Silas E. Brigham & Co., of Southborough, although probably not quite pure blooded Durham, is still a

very good animal, and is worthy of commendation. We therefore recommend that a gratuity of $25 be awarded to them for their bull. The others were not only very far from being pure blood animals, but possessed no other qualities which deserve recommendation. Their owners undoubtedly believe what they say, but are very much mistaken.

For the Committee,

T. E. Payson, *Chairman.*

Report of the Committee on Devons.

In the execution of their duties the committee have necessarily experienced some embarrassment, resulting not alone from the difficulties which occur in deciding on cases where the shades of difference are scarcely perceptible, but, in some degree, owing to the want, of what the committee deemed, proper evidence as to the purity of blood of the animals offered for premium. Acting under the rules prescribed by the trustees of the State Society, the committee felt bound to a rigid adherence to them, and that nothing but pure blood had any apology for the granting of a premium. Although there were animals presented that were very perfect in form, and such as manifested great excellence in breeding, and were individually almost perfect for the class under examination, yet the defect of a single link in the chain of their pedigree has placed them out of the reach of the society's liberal benefaction. Such they have felt compelled to pass by without further comment. There were others placed before them, of peculiar merit and beauty, but whose owners had not taken proper measures to bring within the regulations of the society. In the opinion of your committee, it is time that all our agricultural societies should assert a claim to high excellence in all the grades of cattle, which they are called upon to approve and commend to the public, and though it may be the beginning of a new era in the progress of improvement in that direction, it cannot fail to produce great benefits to the interest of the farmer. Animals to which premiums are awarded by the State or County societies, should be acknowledged to have an equal merit with any others in the country; purchasers of blood stock should never be allowed room to doubt for a

moment, that they have the purity of blood, and that duly proved, for which they have bargained. This point being settled, habits of accuracy will be introduced among all stock breeders which will set at rest all doubt as to the origin and progress of every individual in the registry. Farmers will then be better able to decide which particular race of cattle is best adapted to his own locality, and may then proceed with a surer hope of success, in improving the character of his own particular choice. With these remarks, your committee would state, that, much to their regret, there were no cows, of the class to which their duty was confined, offered for the society's premium. Six very fine ones from the herd of William Buckminster, Esq., were offered for exhibition only, and attracted much attention.

Of bulls, there were eleven entered for premium, and two of much promise, owned by William Buckminster, for exhibition only. Of those entered for premiums, several were unfortunately debarred from competition for reasons before stated.

The committee have awarded premiums as follows, viz. :—

To Harvey Dodge, of Sutton, for his bull Duke of Devonshire, one year and four months old, the first premium, of fifty dollars.

To John Brooks, Jr., of Princeton, for his bull, two years and three months old, the second premium, of forty dollars.

To Peter Harwood, of Barre, for his bull, two years and six months old, the third premium, of twenty-five dollars.

For the Committee,

SAMUEL CHANDLER, *Chairman.*

Report of the Committee on Ayrshires.

The committee appointed by the Trustees of the Massachusetts Society for Promoting Agriculture, to award premiums for the State Show of dairy stock, in Nos. 3 and 6, embracing Ayrshire stock only, respectfully submit the following report:—

That the Ayrshire breed of animals have for more than half a century been in high repute in Scotland and other regions where they have been disseminated as a milking race, of hardy constitution, giving more milk of their inches than any other

variety, and of a quality certainly equal to any imported to this country save the Jerseys, and perhaps the Devons.

We believe that it is universally admitted that the county of Ayr and its vicinity, in Scotland, is the home of this breed. Whether they have been brought to their present perfection by judicious selections from the ancient race, or by crosses with other races that had properties they wished to ingraft into their own, is left to conjecture.

That the stock of that locality were originally poor milkers, mostly of black color, with "line backs" and white faces, is pretty certain. That the color now is almost invariably a dark red, chestnut or brown, interspersed more or less with white, and frequently with dark spots dotting the white surface, and instead of white being as formerly located uniformly over a herd, it is rare to find two speckled alike,* showing, as the committee think, that crosses, rather than improvements incident to high culture, have effected this striking change in color, and have had an influence in increasing their size, and it has attained one now as large as the generality of New England farms will perpetuate. If this is so, for dairy stock, they are large enough; for we are confident that any stock will be more productive when so kept that their properties shall be fully developed, than when stunted or suffered to degenerate.

That the good milking properties of this breed are more uniform and certain than any other imported stock, save the Jerseys, we fully believe. And, notwithstanding the admitted productiveness of the Jersey cow, when every attention is paid to her wants, it may be doubted whether, for farm and dairy purposes, she should be preferred to the Aryshire.

I have appended the following note, because coming, as I think it does, from one whose preferences are in favor of the Durhams, it is a valuable commendation to the Ayrshire cow.†

* The foregoing remarks as to color are more particularly applicable to those imported by Mr. Randall, of this State, and Mr. Prentiss, of Albany, than to those imported by Mr. Cushing, of Watertown, and Mr. Brodie, of New York. These last had more white, but the white ground was dotted thick with red spots.

† In the Library of Useful Knowledge, a standard work published in London, in 1834, the writer says: "As mere milkers, they, (the Ayrshires,) cannot compare with the long-established dairy cow, the short-horn. They yield as

There were nine bulls entered for premium in this Class.
Two by George M. Barrett, of Concord, 2 and 4 years old.
One by Leonard Hoar, of Lincoln, 3½ years old.
One by John Brooks, Jr., of Princeton, 3 years 10 months old.
One by Silvester Phillips, of Hopkinton, 3 years 8 months old.
One by Luke Sweetser, of Amherst, 2 years 3 months old.
One by John W. Lincoln, of Worcester, 2 years 7 months old.
" " " " 2 " 3 " "
" " " " 1 " 7 " "

After a careful inspection of the animals, and an examination of the statements of the several competitors, as to age, treatment, rearing and keeping, and also pedigree as far as given, confirming purity of blood in this race, we recommend that the premiums offered by the trustees, on Ayrshire Stock, be awarded as follows:—

much milk in proportion to their size and food, but not in proportion to the room they occupy, and the increased trouble they give from being more numerous in order to require the requisite quantity of milk.

"They produce an unusual quantity of rich cream, but there was so much difficulty in procuring them so as to keep up the stock, and the price asked for them was often so great, that they were comparatively abandoned."

As to their fattening qualities, the same writer says: "They unite, perhaps, to a greater degree than any other breed, the supposed incompatible properties of yielding a great deal of milk and beef. It will be long, perhaps, before they will be favorites with the butcher, for the fifth quarter will not usually weigh well in them; their fat is mingled with the flesh, rather than separated in the form of tallow. Two circumstances, however, may partially account for their not being thought to succeed so well when grazed. They are not able to travel so far on the same keeping as the highland cattle, and from their great value as milkers, they are often kept until they are too old to fatten to advantage, or for the beef to become of the first quality."

If the laudable efforts made by the Massachusetts Society to introduce full blood dairy stock, should be seconded by county societies and individuals, by encouraging the keeping the various races pure, and insisting upon a full history of all prize animals, tracing back their pedigree, the farmer will soon have at his command, the means of comparing and ascertaining for himself the cross most desirable. And although it may be admitted that the first cross from pure stock may excel in some points, a further cross will produce a degenerate and uncertain progeny. Therefore the importance, if any one proposes to breed grades, of being certain of the purity of the parent stock upon one side; as almost universal experience has demonstrated that you are far more sure to breed a good animal from a full blood, crossed with a race having no affinity, than from half-bloods of the same race.

First premium to William S. Lincoln, of Worcester, for his bull, Bruce, from McGregor and Swinley stock, $50.

Second premium to John Brooks, Jr., of Princeton, for his bull, bred by Daniel Webster, $40.

Third premium to William S. Lincoln, for his bull, Rob Roy, descended from the imported Ayrshire bull, Swinley, $25.

There were three cows entered for exhibition only, by William S. Lincoln, of Worcester. One ten years old, had run with a pair of twin calves the past summer; one three years old, had been in milk nearly a year; another five years old, now dry, a very promising cow, and all fine animals, with a pedigree which makes the purity of their blood undoubted. Their calves were also fine well bred animals.

Our attention was also called to some grade Ayrshires belonging to the Hon. John Brooks, of Princeton, from a cross of the State importation. They were a good lot of cows, reported to be good milkers, and had strong indications of Ayrshire blood. He had at the show, some fine heifer calves from these cows, by his Ayrshire bull.

Moses Newell, *Chairman.*

Report of the Committee on Alderneys.

The committee appointed by the Trustees of the Massachusetts Society for Promoting Agriculture, on Jersey or Alderney stock, under Classes No. 3 and No. 6, have attended to the duty assigned them, and ask leave to present the following report:—

For the premiums five bulls were offered, and three for exhibition by the Massachusetts Society. As the premiums extended to persons all over the Commonwealth, your committee regret that a larger number were not offered for their examination. The bulls presented were, however, all of them superior animals, and all worthy of premiums. After a full and thorough examination of each of the animals, and also the accompanying statements, signed and sworn to by the reputed owners, your committee make the following award:—

For the best Jersey bull, 1 year old, to William Spencer, of Lowell, ... $50 00
For the 2d best, to Stephen Salisbury, of Worcester, . 40 00
For the 3d best, to Joseph Burnett, of Southborough, for his bull "Czar," 25 00

The premiums offered under Class No. 3, were—

For the best Jersey or Alderney cow, . . . $50 00
For the next best, ... 35 00

Your committee are pained to report, that not a single entry for premium was made under this class. The premiums being quite liberal, your committee had every reason to suppose that a large number of the best breed of cows would have been offered for their inspection. As it is, their duties in this respect are ended, by this expression of their disappointment and regret.

But your committee had the satisfaction of viewing a herd of three Jersey cows, offered for exhibition by our enterprising and public spirited fellow-citizen, Hon. Stephen Salisbury, of Worcester, to whose exertions the Massachusetts Society, as well as this community, are much indebted, for the importation of blood cattle, as well as for improvements in other departments of agriculture. These cows are a very fine specimen of the Jersey breed, and are named respectively, "Lady," "Judy," and "Fawn." They were imported by himself, in 1853, and would have been worthy of a premium, if he had complied with the society's requisitions in regard to the quantity of milk, butter, &c. Your committee recommend that the thanks of the Massachusetts Society be presented to Mr. Salisbury for his importation and exhibition of these cows.

A lot of cows and bulls were also entered by the Massachusetts Society, for exhibition and sale. They were imported, or were the progeny of imported stock, and are undoubtedly the finest collection of that breed of animals in this Commonwealth. That society deserves the high commendation of our people for importing that stock, and thus enabling all to judge of their qualities as milkers, and the utility of a cross with our native or other breeds.

Your committee recommend that the usual compensation be allowed to Joseph Burnett, of Southborough, for travel for his bull, "Rob Roy," for which no premium was given.

Respectfully submitted,

HENRY W. CUSHMAN, *Chairman.*

WORCESTER, September 24, 1856.

Report of the Committee on Native and Grade Bulls.

The committee on "Bulls of native or mixed breed," under Class No. 6, respectfully report, that the whole number of entries in their department was sixteen, as follows:—

No. 1. Moses Thompson, New Braintree, Worcester County, bull 3 years and 7 months old, three-fourths Durham and one-fourth Hereford.

No. 2. Henry Boyles, Princeton, Worcester County, bull 4 years and 6 months old, one-half Devon and one-half native.

No. 3. Nathan Danforth, Princeton, Worcester County, bull 1 year and 4 months old, Ayrshire and Durham.

No. 4. Asa G. Sheldon, Wilmington, Middlesex County, native bull, 4 years old.

No. 5. George E. Allen, Barre, Worcester County, bull one-half native, one-fourth Hereford, and one-fourth Durham, 1 year 6½ months old.

No. 6. Phineas A. Beaman, Princeton, Worcester County, bull 2 years and 4 months old, Durham and native.

No. 7. Daniel Dwight, Jr., Dudley, Worcester County, bull 15½ months old, Durham and Devon.

No. 8. Moses Smith, Hardwick, Worcester County, bull 3 years and 6 months old, one-half Durham, one-fourth Hereford, and one-fourth native.

No. 9. Taylor Stockwell, Sutton, Worcester County, bull 1 year and 6 months old, native.

No. 10. James Dewell, West Stockbridge, Berkshire County, bull 4 years old, Hereford and Durham.

No. 11. Aaron Gould, Douglas, Worcester County, bull 1

year and 5 months old, one-fourth Durham, one-fourth Devon, and one-half-native.

No. 12. Francis Carroll, Grafton, Worcester County, bull 2 years and 7 months old, Durham and Ayrshire.

No. 13. Sewall Richardson, Princeton, Worcester County, bull 3 years and 6 months old, one-fourth Durham, one-fourth Devon, and one-half native.

No. 14. Aaron B. Rice, Marlboro', Middlesex County, bull 3 years and 5 months old, one-half Durham, one-fourth Ayrshire, and one-fourth native.

No. 15. Jepthah Conant, Stowe, Middlesex County, bull 2 years and 4 months old, one-eighth Durham and seven-eighths native.

No. 16. William Adams, Jr., West Brookfield, Worcester County, bull 2 years and 5 months old, native.

The breed of the bulls is given as set forth in the statements of the owners, but in several instances the animals indicated a mixture of other blood.

We award to Moses Thompson, of New Braintree, Worcester County, for his Durham and Hereford bull, No. 1, the first premium, $50; to Daniel Dwight, Jr., of Dudley, Worcester County, for his Durham and Devon bull, No. 7, the second premium, $40; and to Francis Carrol, Grafton, Worcester County, for his Durham and Ayrshire bull, No. 12, the third premium, $25.

The committee were unanimous in awarding the first and second premiums, but were divided in opinion as to the third. Each of the sixteen bulls exhibited had some excellent points, and after those for which were awarded the first and second premiums, several possessed nearly equal merit. All of the bulls were worthy of exhibition, and the committee recommend the payment of twelve cents per mile to each of the owners whose bull was brought more than ten miles.

The committee express their surprise and regret that the very liberal premiums offered, did not bring to the exhibition animals in this class from a greater number of the counties.

Respectfully submitted, for the Committee,

J. H. W. Page, *Chairman.*

Worcester, September 25, 1856.

NEAT STOCK.

ESSEX.

From the Report of the Committee.

Milch Cows of Native or Mixed Breed.—Thirteen cows were offered for premium, and statements conforming to the rules of the society were given of the product of four of these. They were generally of a superior character, and it is to be regretted that particular statements were not made in writing of their milk and butter producing qualities, as some of them would without doubt have secured more substantial notice.

How much milk is required to make a pound of butter, is a question often asked. From the statements herewith submitted, it appears that the average quantity of milk of five different cows required to make a pound of butter, is $9\frac{1}{4}$ quarts. The quantity varied from 8 to $11\frac{3}{4}$ quarts to the pound.

We have heard that a pound of butter has been made from 4 quarts of milk, and have heard likewise of cows, 14 quarts of whose milk were required to make the same quantity. It is probable that every dairy farmer of common intelligence in the management of his business, has discovered that a certain quantity of milk in the autumn months will produce much more butter than the same quantity from the same cows will in June or July. Will not this fact account in some measure for the great variety of reports we hear from the owners of cows on this subject?

We are of opinion that there may be found in almost any herd of twelve cows, a difference of three or four quarts to the pound in the capacity of their milk for producing butter. To arrive at an answer to this question, there should be a trial made, during one year, in four or five dairies.

From the statements made by the competitors at this time, as also from our own experience and observation, we conclude that a fair average is 9 quarts of milk to the pound.

Is the man to be found in Massachusetts, who has cows for sale, which he will guarantee to give a quantity of milk comparing well with that given by our native cows, the quality being

equal to 4 quarts to a pound of butter, the trial to continue through one year? If not, do not such reports mislead those who are seeking to improve their herd of cows by the purchase of the best animals? They may find to their cost that they have turned off better cows to give place to those boasting a distinguished foreign ancestry. It is not probable that thirteen cows of the foreign breeds can be found in this county, comparing favorably in productiveness with the natives that have been exhibited at the society's show this year.

There is undoubtedly great room for improvement in our domestic race of cows; and would it not be well for some of our amateur farmers to consider the expediency of appropriating a portion of the money they are now investing in imported stock, to raising up an improved domestic or American race of cows, so that in future years their descendants may point to a native and purely American breed, which shall as far surpass the Durhams, Devons and Jerseys, as American ploughs, reapers and printing presses now surpass those of England and France.

CHARLES P. PRESTON, *Chairman.*

Statement of Paul T. Winkley.

The two cows which I present for inspection and the consideration of the committee, are native, or unknown breed. No. 1 is 5 years old; No. 2 is 8 years old. No. 2 calved last March; her milk was measured one day of each week during the month of June, which averaged 18 quarts per day. Her milk was set for butter the first week in July, when she was giving 16 quarts per day, which made 13 lbs. She is now giving 15 quarts per day. No. 1 calved last July; her average quantity of milk for the month of August was 18 quarts per day. Her milk was set for butter the last week in September, when she was giving 16 quarts per day, which made 12 lbs.

Their keeping has been, since they were turned out last spring, a good pasture, and nothing else.

NEWBURYPORT, October 1, 1856.

Statement of Daniel G. Todd.

I offer for premium one cow, 6 years old, one-half Durham, one-half native. She dropped her last calf December 13, 1855; the calf was weaned the 1st day of March, 1856.

In the month of March, 1856, she gave 434 quarts of milk, of which it took 9 quarts (wine measure) for one pound of butter, making 48 lbs. 2 oz. of butter in one month. Since then, her milk has been mixed with that of other cows.

During the month of	April,	she gave	360	quarts of	milk.	
"	"	May,	"	403	"	"
"	"	June,	"	420	"	"
"	"	July	"	372	"	"
"	"	August,	"	403	"	"
"	"	Sept.,	"	300	"	"
				2,258		
				474		
		Total,		2,732	quarts.	

Her feed from the time she dropped her calf, has been one-half English hay, one-half salt hay, chopped and mixed with 2 quarts of cob meal, or 6 quarts of carrots, till pasture time. Since then, nothing but common pasture till the middle of August, and then corn-fodder at night to the present time.

Rowley, October 1, 1856.

Statement of John E. Remick.

The cow I enter for premium is of native breed, 6 years old last March, and I have raised her from a calf. From the 16th of April last to the 16th of September, she has given 750 gallons of milk, (beer measure.) Sold from

April 16 to May 16,	96	gallons	milk, and made	18	lbs.	butter.
May 16 to June 16,	81	"	"	25	"	"
June 16 to July 16,	90	"	"	18	"	"

July 16 to Aug. 16,	92	gallons milk, and made		18	lbs.	butter.
Aug. 16 to Sept. 16,	95	"	"	22	"	"
Total,	454	gallons.		101	lbs.	

She has not been dry ninety days during the last three years. Last Thursday, from 12 quarts of her milk, I churned 1½ lbs. butter, of good color and flavor.

Her feed has been common pasture, and 4 quarts per day of meal and shorts.

Newburyport, September 30, 1856.

Report of the Committee.

Steers.—The committee on steers find themselves in the same situation to express a regret as the committees in former years, that so few steers are offered for show and premium.

And if we ask the question, why so few farmers of Essex county enter into the raising of this class of stock, we take it for granted the answer would be simply this—that the demand for hay is so great, and the price so high, that the business is not profitable, or the raising of heifers and keeping of cows are more profitable.

Still it may be asked if the price of a likely pair of steers has not advanced in equal proportion with other stock?

William M. Kimball, *Chairman.*

Report of the Committee.

Bulls of Foreign Breed.—The Durham short-horns, and the Herefords, were not represented. The inference therefore is, that we have no pure bloods of either of those breeds in the county. No Ayrshire was entered for premium, but a very promising yearling bull of that breed was exhibited by the president of the society. He is from the best Ayrshire stock in the State, which is as good as any in the country, and ought to leave a progeny in the neighborhood where he is, which shall make his name to be remembered.

Three Devons were entered for premium. No question was made as to the purity of the blood of either of them. The committee were unanimous in awarding the first premium for the best Devon bull, to Paul Titcomb, of Byfield. His bull was imported from the north of Devonshire.

There were four entries of Jerseys. One of them showed no marks of purity of blood, and no evidence was furnished by his owner, which tended to establish the fact. His merits, if he had any, were of course not considered by us. No question was raised in relation to the blood of either of the others. After careful examination, the committee awarded the first premium for the best Jersey bull, to Richard S. Rogers, of South Danvers, for his bull, "Duke."

The trustees of the Essex Society, from its formation to the present time, have manifested great desire to improve our stock. In 1823, Col. Pickering proposed to pay "to the person who should produce at the public exhibition of the society, in the year 1828, any number of milch cows, not less than four, of our native breeds, showing manifest improvement therein, &c.," premiums of $30, $25 and $20; and for bulls raised in the county and improved on the same principles, premiums of $20, $15 and $10. These offers of premiums substantially in this form were continued until 1834. There is no record that they were ever awarded. In making the proposition, Col. Pickering said: "It will readily be admitted that our live stock demand great improvements; and no one will question whether such improvements are practicable. They ought then to be attempted. It will avail little to bestow premiums merely for the best that shall be produced; for such premiums might be given for a century, without effecting any real improvement, and thus, as to live stock, defeat the object for which the society was formed." It may well become us to review the field from 1823, and see if we have been doing any thing but bestowing premiums "merely for the best that have been produced."

At times the trustees have seen fit to offer premiums for the offspring of premium stock, such offspring to be exhibited at the cattle show next after it had attained the age of one or two years, and be entitled to the same premium which its dam had received, but we do not recollect that a premium was ever awarded to bull or heifer because descended from stock which

had received premiums. We doubt even, whether any such animals ever competed for premiums.

It is very clear, therefore, that our offers of prizes have not as yet had the effect to induce any systematic, intelligent attempt to improve the stock of the county, especially in that particular most desirable, viz., for dairy purposes. Pure blood bulls of the different foreign breeds have been introduced from time to time into different parts of the county, and all sorts of haphazard crossing has followed. Men do not ask themselves the question, whether a bull belongs to the milk-secreting or fat forming division of animals, and yet they will all admit that a cow which has a disposition to take on fat while in milk, is comparatively worthless.

The farmer has a good cow, which he highly values and whose good qualities he desires to perpetuate. He seeks a good bull, finds one well formed, a good handler, perhaps of a deep red color, which is always attractive to a New England eye, and having a long pedigree. He may have been imported. He watches intensely for the calf. He knows that infancy always influences age, and that a large and liberal herbage with care and warmth during the first year, will excite growth and fineness. He therefore rears it carefully and keeps it well. It turns out a bad milker. He is disappointed and disgusted, but had no reason to expect any thing else, for he made a very improper selection in the male animal. It did not belong to a milk-secreting breed, and therefore, the cross defeated the tendencies of the cow.

But this is one of the best examples of breeding, for the farmer makes the attempt, however ill-judged, to improve. In most cases the attempt even is not made. A bull calf is raised because he is good looking, although his dam is far below the average of dairy cows. He has a cow to suck the first summer, grows well, is the wonder of the neighborhood, goes to the cattle show and gets a premium. He probably never gets a heifer calf worth raising. Or a bull calf is raised, because he is so lean as to be rejected by the butcher. He picks his way up as best he can, is always a hungry looking animal; but he is a bull, and can get calves, and the majority of farmers neither care what he is, nor how he is bred. Not only is it true that no principles govern us in our attempts at breeding, but that we hardly employ the

ordinary exercise of reason. Perhaps a majority of farmers may not be expected to consider physiological tendencies and intrinsic qualities, but we can all follow the teachings of common sense. The principles which have governed the breeders of live stock in England, from Bakewell to the present day, are "fine forms, small bones, and a true disposition readily to take on fat, which is indeed inseparable from small bones, or rather fine bones, and fine forms, or true symmetry of the parts." Durhams, Herefords and Devons have all been bred with especial reference to their disposition to fatten, early maturity, weight in the most valuable parts, with lightness of offal, and a form indicating strength of constitution.

Every body who has had any experience knows that such qualities do not belong to animals valuable for milk-secreting properties, and that cows thus formed always have small udders, and that small udders always yield but a small supply of milk.

Adopting the principles which we have stated, English breeders have put them into successful practice, in the first place by invariably selecting those animals to breed from on both sides which were possessed in the highest degree of the points desired, and in the next by abundant nourishment from the earliest period of the existence of the young animal until its growth is complete.

Climate does much to aid man in changing the course of animated and sentient nature and forming it to his mind; but herbage and food, so far as the changes which we are now considering are concerned, will do more. On this point we shall be excused for quoting an eloquent English writer of modern date, whether his reasoning be altogether correct or not. "Take only twin calves," says he, "give the one his mother's milk for six months, and feed the other on hay-tea and linseed: the one will be a large, thriving animal, the other shrunk and meagre and stunted. It is the effects of its pasturage. It has not the exact food calculated to develop its qualities—and it shows its want—not by dying, but by overcoming all in an altered form. Now take the same twins, leave one in the fertile valley of the Tees and drive the other to the barren Jersey. The one has an alluvial soil, deposited by the *debris* of a thousand generations. It browses on the grass once the bed of the wide-flowing river, filled up with the finest and most soluble particles of earth washed out of the virgin soil before it was cultivated, mixed

with the phosphated earth from the washings of the mountain limestone, and hence he had plenty and slept; he had abundant in ammonia for his flesh and phosphates for his bones; he lived luxuriously and easily, and he got somnolent, lethargic and fat. He grew in size and in bulk—the one as regards his height and the other his thickness, and hence in his breed was formed the Teeswater race.

"The other had to pick up a scanty subsistence on the barren rocks. He had long to browse for a scanty morsel. His grass was poor and innutritious, and he had to be roaming all day and skipping from height to height to obtain a meagre portion. Here he was active and thin—he was small and flat in his muscles. Animals of this kind were bred from and they became more and more adapted to their climate and soil and circumstances. But his young could barely live on this poor herbage—hence more milk was required to support them; the converse of the imaginary compeer in Teesdale, and the one is a good milker and the other a bad one."

Whether the reason given is the true one or not, the fact is undoubtedly so that the descendants of the one would be good milkers, and of the other, bad, and the difference in shape between the two would be very much as the difference between a round, straight, upright, faultless, improved Devon, and an unimproved Alderney, which was probably about as great a violation of the symmetrical points of a well-formed animal as it is easy to imagine. In closing our report we can safely say that the offer of prizes has not hitherto induced to any judicious, systematic and intelligent attempt to improve the milch stock of the county.

That such improvement can never be effected by indiscriminate crossing, but must have at the start a definite aim, a clearly ascertained object and a well-arranged, unvarying plan.

That crossing with bulls whose ancestors, as well as themselves, have been bred entirely with a view to symmetry of form and without reference to milk-secreting qualities, will work deterioration instead of improvement, for thereby will be produced better cows for the butcher and poorer ones for the dairyman.

The committee express no opinion as to the means best adapted to improve our stock. If the breeding of oxen alone

was in question, they would unanimously recommend judicious crossing with the Devon. But the breeding of cows is a very different thing. Some of the committee would undoubtedly recommend crossing with those foreign breeds whose tendency is to secrete milk. Others would recommend selections from our own stock of such as possess in the greatest degree the properties desired, and by a system of careful breeding give to those properties a prominence and permanency, which should be the characteristics of a distinct breed of improved native American cows. In this way it is that the foreign breeds have been improved. All superior short-horns claim descent nearly or remotely from Mr. Colling's bull, Hubback. He and his dam were purchased of a poor man, because they happened to possess just the properties which in Mr. Colling's judgment would bring about the results which he obtained. The cow when removed to good land became so fat that she did not again breed, and her son having the same feeding propensity in a high degree, was useful as a bull during only a very short period.

Pigeon and Mottle, the two cows through which the Herefords were improved, were purchased at the fair of Kingston, on the confines of Wales. Mr. Tomkins remarked the very extraordinary tendency of these cows to become fat, and his good judgment convinced him that they were just the animals with which to work out his theory. He succeeded, and it is a remarkable fact that the peculiar marking of those two cows may be distinguished in their descendants at the present day.

If some man like Bakewell, or Charles Colling, or Benjamin Tomkins, shall luckily rise up and undertake the improvement of our stock for dairy purposes, we shall have a breed which can have no superior. Until then we shall probably go on importing cattle, raising calves, offering premiums, and talking loosely about the matter—but without effecting any permanent good.

T. E. Payson, *Chairman.*

WORCESTER.

From the Report of the Committee.

Bulls.—An examination of the breeds and pedigrees of the different bulls three years old and over, developed one fact, characteristic of this exhibition and worthy of remark. No bull was entered for premium as a pure native, nor any in which the native blood so called predominated. All were classed either among the Durhams, Devons, Ayrshires, Alderneys, or Herefords. In each class—except, perhaps, the Herefords—the full blood animal was present. From this fact these inferences were drawn—that the native stock is fast becoming impregnated with foreign blood; and, as a distinct breed, it is rapidly running out; that purity of blood and a good pedigree are the best inheritance that any breeding stock can receive; that the sire transmits more of his individuality than the dam, hence to insure success in thorough breeding, every thing depends upon the sure transmission of the individual quality of the sire to his progeny. Your committee were governed in a great degree, in awarding the premiums, by the conclusions drawn from these inferences.

W. F. Wheeler, *Chairman.*

From the Report of the Committee.

Steers.—The committee on steers under three years old, having attended to their duty, ask leave to submit the following report:—

In breeding cattle for the yoke, it is of the utmost importance to secure a decided breed, that will produce animals of uniform size, color and form. We all know how vexatious it is to raise steers year after year, and ride hundreds of miles to get mates for them. The introduction of pure blooded animals from Europe, by liberal importations of the Massachusetts Society for Promoting Agriculture, and public spirited individuals, has lessened this trouble and expense. The Devons, Herefords, Durhams and Ayrshires, are to be found in almost every town in the State; and whether full bloods or grades, show strong simi-

larity. If working oxen were the only object to the farmers of this county, we would recommend a cross of the Devons with the Herefords, but as we want our heifers for milch cows, we would prefer a cross of the Devons or Ayrshires, with the Durhams, or the best of our native stock, to full bloods of either breed. The ox for the yoke is, and always must be, from the nature of our soil, of great importance to the farmers of this county; beauty of form and color are desirable; a compact round body, deep broad chest, straight back, fair length of leg, bones not to large, well-developed muscles, clear bright pleasant eye, fine mellow skin and hair, and weight at six years old, about 3,200 lbs. to the pair. These perfections give strength, activity, and endurance; large size does not. They are more liable to accident and not so free in their movements, and as a general rule, not so desirable, or profitable as the medium sized ox. We think that too much has been reckoned on the large yearlings, and two year old steers which have been presented for premium; it has too often been the case when our object has been to improve our working oxen, we have given our preference to those steers, of uncommon size, whose fat sides have taken the fancy of our eye, and only exhibited such perfections as were desirable for the shambles. It is too often the case that the steers which win our prizes never appear either in the plough field or at the trial of working oxen. This ought not to be. The steers which ought to receive our commendation should be only such as show those qualities that will make useful and valuable oxen.

HENRY R. KEITH, *Chairman.*

From the Report of the Committee.

MILCH COWS.—The committee on milch cows have attended to that duty, and would report, that but little more seems to be required of your committee than to lay before you the results of their deliberations, in this department of the exhibition.

In the very able reports on milch cows which have been submitted to the society within the two or three last years, particularly those of our late president, many valuable hints and suggestions have been given to the public; and your committee

would only reiterate what has been so well said if they were to extend their remarks.

The number of milch cows entered for premium was ten, and eleven for exhibition. Besides these, a dairy of ten cows was entered by W. W. Watson, of Princeton, for the society's premium.

At no period has there been a finer show of cows, than has been witnessed in the pens to-day.

The great preponderance of breeds of foreign or mixed blood, shows conclusively, the estimate in which they are held by our farmers, who have entered upon this branch of production.

Of the native cows, one owned by W. W. Watson, was deemed to be an extraordinary animal. The rules of the society cut her off from being entered for a premium. According to his statement, she had produced two lbs. of butter per day for the last six months, and had been in milk some fifteen months.

Owing to a neglect on the part of the applicants for premiums to comply with the rules of the society, only three of the six at their disposal were awarded by the committee.

The two best cows, raised by the competitor, and kept with a stock of not less than four, were exhibited by John Brooks, Jr., of Princeton.

These were three-fourths Ayrshire, and 5 years old each. The daily flow of milk, according to the statement, was respectively, for the ten days in June, 36.48 and 34.60 lbs. In quantity, 14.79 and 14.12 beer quarts. The number of lbs. of butter which this milk produced was, each, 13.91 and 13.21 lbs. for a week or seven days, 9.73 and 9.25 lbs. The whole quantity of milk for these ten days was, 364.81 and 346 lbs., respectively. For the ten days in September, the daily flow of milk was 30.04 lbs., or 12.26 beer quarts, and 29.80 lbs. or 12.16 beer quarts.

The number of lbs. of butter from this milk was 13.33 lbs. and 13.12 lbs., which shows but a small variation from the quantity produced in June.

The best cow raised by the competitor, and kept with a stock of not less than four, was owned by John Brooks, Jr.

This cow was one-half Ayrshire, and a fine looking animal. She gave in ten days in June, 390.50 lbs. of milk. Her daily

flow, 39.05 lbs., or 15.91 beer quarts. There were made of this milk, 14.88 lbs. of butter, or 10.41 lbs. for seven days.

In September, she gave in ten days, 332 lbs. of milk, or daily, 33.20 lbs., or 13.55 beer quarts. The lbs. of butter made from this milk were 14.85. The whole quantity of milk produced in these ten days was 332 lbs.

The cow Fanny, owned by William Eames, of Worcester, was a very fine animal, three-fourths Devon, and one-fourth Durham. She gave in ten days in June 107 quarts 1 pint, or 267 lbs. milk, from which was made $15\frac{1}{2}$ lbs. of butter. In ten days in September, she gave 86 quarts, or 215 lbs. of milk, which made $12\frac{1}{4}$ lbs. of butter.

It is particularly desirable that exact statements be given, that committees may be able to arrive at right conclusions, and justice be rendered to competitors, for the premiums of the society.

The great object of the society is to elicit facts relating to agriculture; and to those who have had the management of its affairs, the community is largely indebted, and it is to be regretted that so few comparatively of our farmers, in this large agricultural county, have become personally interested in its prosperity.

It has done and is doing a good work. Its influence is felt in every department of farming pursuit. In the improvement of neat stock, by the introduction of foreign breeds, their proper management and comparative value has ever been an object of deep solicitude with the society, and liberal premiums have been offered that these results might be obtained, and laid before the farming community. No farmer can afford to keep a poor cow, and the best, by injudicious management, may become indifferent. Nor should he resort to the hap-hazard mode now pursued in replenishing his yards—of purchasing from droves—particularly his dairy cows.

He should raise his own stock, and care should be taken in the selection of breeds which combine most of the qualities desired, and then by proper care, purity of blood should be transmitted to their offspring. By this plan, above any other, a farmer may feel a confidence that he is pursuing at least a sensible mode of replenishing his yard with valuable animals.

A. G. Hill, *Chairman.*

Statement of John Brooks, Jr.

Memoranda of the milk of three cows owned by John Brooks, Jr., of Princeton, for the first ten days of June and September, 1856:—

MONTH.	Number One.		Number Two.		Number Three.	
	Morning.	Evening.	Morning.	Evening.	Morning.	Evening.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
June 1,	16.00	22.00	16.50	21.50	14.00	18.00
" 2,	17.50	21.00	15.00	18.00	13.00	19.00
" 3,	14.00	21.50	14.00	20.00	13.00	19.50
" 4,	17.00	23.00	15.50	21.00	15.50	20.00
" 5,	16.50	22.00	12.00	21.00	13.00	22.00
" 6,	18.00	21.00	18.00	21.50	15.00	20.50
" 7,	18.50	21 50	16.50	21.00	15.50	19.00
" 8,	19.50	21.50	16.50	20.00	15.00	20.00
" 9,	17.00	24.00	15.50	22.00	14.50	21.50
" 10,	16.50	22.50	16.00	20.31	16.00	22.00
Totals,	170.50	220.00	155.50	209.31	144.50	201.50
		170.50		155.50		144.50
		390.50		364.81		346.00
September 1,	13.50	17.00	12.50	15.50	12.00	15.25
" 2,	15.50	18.00	13.50	15.75	13.25	15.81
" 3,	15.75	17.25	14.00	16.50	14.75	17.00
" 4,	13.50	18.00	14.50	19.00	13 25	16.00
" 5,	16.00	18.25	14.00	16.50	13.50	18.00
" 6,	17.50	17.50	14.50	16.00	13.50	16.25
" 7,	17.00	17.00	13.87	15.50	14.44	16.50
" 8,	17.00	16.00	14.56	15.00	14.50	15.00
" 9,	16.00	17.25	14.25	16.00	14.50	16.00
" 10,	15.50	18.50	13.50	15.50	13.00	15.50
Totals,	157.25	174.75	139.18	161.25	136.69	161.31
		157.25		139.18		136.69
		332.00		300.43		298.00

Ten days in June, daily flow of milk—

Cow, No. 1, 39.05 lbs., or 15.91 beer quarts.
" No. 2, 36.48 " 14.89 "
" No. 3, 34.60 " 14.12 "

Product of butter, for ten days:—

Cow, No. 1, 14.88 lbs., or 10.41 lbs. per week.
" No. 2, 13.91 " 9.73 " "
" No. 3, 13.21 " 9.25 " "

Total flow of milk in ten days, 1,101.32 lbs.; total of butter, 42 lbs., equal to 3.82 per cent. of the milk.

Ten days in September, daily flow of milk—

Cow, No. 1, 33.20 lbs, or 13.55 beer quarts.
" No. 2, 30.04 " 12.26 "
" No. 3, 29.80 " 12.16 "

Product of butter, for ten days—

Cow, No. 1, 14.85 lbs., or 10.40 lbs. per week.
" No. 2, 13.33 " 9.33 " "
" No. 3, 13.12 " 9.18 " "

Total flow of milk in this ten days, 930.43 lbs.; total of butter, 41.30 lbs.; 4.43 per cent. of the milk was butter.

Live weight of No. 1, is 990 lbs.; her average daily flow of milk, 36.12 lbs., or 3.64 per cent. of her live weight. Live weight of No. 2, is 910 lbs.; average daily flow of milk, 33.26 lbs., or 3.65 per cent. of her live weight. Live weight of No. 3, 998 lbs.; average daily flow of milk, 32.20 lbs., 3.23 per cent. of her live weight.

Nos. 2 and 3 of these cows I present for the premium offered by the society for the two best cows, raised by the competitor, and kept with a stock of not less than four. Their age is 5 years, and their breed is three-fourths Ayrshire, McGregor stock, have been kept with a herd of eight cows, and on pasture feed only; they both calved the last week of March last, and will calve again in March next. The quality of their last calves was good. Usual time of milking, six o'clock, morning and evening. I raise my calves, and sell a large portion of my milk, and therefore cannot state the amount of butter, cheese, or veal made by the dairy. I have kept this season three large swine, which have been fed on skimmed milk and the slops from the house. These two cows were dried the middle of January last.

No. 1, I present for the premium offered by the society for the best cow, raised by the competitor, and kept with a stock of not less than four. She is 7 years old, breed one-half Ayrshire. She has been kept in a herd of eight cows, and on pasture grass only. She calved the middle of March last, and will calve about the same time next March. She was dried the middle of January last. Her last calf was of good quality, which I raised.

When on trial in June, all the cows were kept in the yard nights; when on trial in September, they were turned out to pasture.

September 23, 1856.

Statement of William Eames.

This may certify that Fanny, one of the cows I enter for the society's premium, is 5 years old, three-fourths Devon, and one-fourth Durham; bred and was raised in Worcester by the subscriber. She calved May 26, 1855. It was a fine bull calf, which was raised. Last dried, April 12, 1855. She is expected to calve again March 23, 1857. She has run in a good pasture with two other cows; had no other feed up to August 15, after which she was fed freely, with the others, on corn fodder night and morning.

Month.	Morning.	Evening.	Month.	Morning.	Evening.
June 1,	5 qts. 1 pt.	6 qts. 0 pt.	Sept. 1,	3 qts. 1 pt.	5 qts. 1 pt.
" 2,	5 " 0 "	6 " 1 "	" 2,	4 " 0 "	5 " 0 "
" 3,	4 " 1 "	5 " 1 "	" 3,	4 " 1 "	6 " 0 "
" 4,	5 " 0 "	6 " 0 "	" 4,	3 " 0 "	5 " 1 "
" 5,	5 " 1 "	6 " 1 "	" 5,	3 " 1 "	5 " 0 "
" 6,	4 " 1 "	5 " 1 "	" 6,	3 " 0 "	4 " 1 "
" 7,	5 " 0 "	5 " 0 "	" 7,	3 " 1 "	4 " 0 "
" 8,	5 " 1 "	6 " 0 "	" 8,	3 " 0 "	4 " 1 "
" 9,	5 " 0 "	5 " 1 "	" 9,	3 " 0 "	5 " 0 "
" 10,	4 " 1 "	5 " 0 "	" 10,	3 " 1 "	5 " 1 "
	50 qts. 0 pt.	57 qts. 1 pt.		35 qts. 1 pt.	50 qts. 1 pt.

Total, 193 quarts 1 pint.

In June, she gave 267 lbs. of milk, making 107 quarts—$2\frac{1}{2}$ lbs. to the quart. In September, she gave 215 lbs., equal to 86 quarts. From the ten days' milk in June were made $15\frac{1}{2}$ lbs. of butter; the ten days in September, $12\frac{1}{4}$ lbs. Time of milking, the same in both months—seven at night, and five in the morning; the day preceding, likewise. I have kept two swine.

HAMPSHIRE, FRANKLIN AND HAMPDEN.

From the Report of the Committee.

On Stock.—The committee on stock in general submit the following report:—

The exhibtion was much in advance of last year. We conceive, however, that it excels more in perfection than fulness. We have had the pleasure of seeing *good*, rather than *many* animals. Still the number of entries far exceeds that of last year. The common remark of the special committee was, "the show in our department has been good," and in many cases, "we never saw so good." In no place was the exhibition of this year meagre; in many points it was rich to opulence.

There were one hundred and thirty entries, against eighty last year.

The general impression we derive from the exhibition is, that within our memory great improvements have been made in stock raising; and more than this, that a spirit of enterprise is abroad, that gives the fairest promise for the future. Such a sentiment is often uttered; but in this exhibition we have had the demonstration of it before us. Our flocks give us larger fleeces and softer wool; our herds give us more milk while they live, and when they die, they bequeath to us the legacy of better beef than they once did. For this improvement we are greatly indebted to the labors of such men as our president and others engaged in the same good work. At great expense of care and money in the outset, they have stocked their farms with Durhams and Devons, and New Oxfordshires and Suffolks. And now the little rills of pure blood, or at least greatly improved blood, have trickled over the boundaries of every town in the three counties. May the pioneers in this noble work never fail of their reward.

The working cattle presented a noble sight. We have seen longer "chains," but never a better show of well-matched, well-to-do, handsome, proper cattle than were on the ground for exhibition.

"The plain ox,
That harmless, guileless, honest animal,"

never appeared to better advantage. There were some pairs possessing uncommon beauty; but a single poor or second rate ox did not obtain leave of his master to come to the show.

The show of bulls was a collection of really superb animals. There was the "Kirkleavington," of South Hadley, the "Roan Duke," of Middlefield, and "Uncle Tom," of Granby. Of these, most would probably think the Kirkleavington the noblest animal. He is a regular autocrat of the herd. There is no *overlooking* his claims, at least by any but a very tall man. We never felt so disposed to take off our hat and respectfully say, "Your majesty" to a beast, as to him. In a word, we call him the Grand Sultan of the cow-yard! And we are happy to learn from his owner, that, like *the* Sultan of the East, he has a large "harem." For reasons plainly connected with the improvement of stock, we sincerely wish that his harem of cows were much larger.

There were other animals besides these three, of beauty and promise, on the ground, to fill up the *bull*-etin; but they undoubtedly suffered from the eclipse of larger bodies.

But the fat cattle constituted a point around which even more interest seemed to cluster than the preceding. It is no misuse of terms to call the exhibition here a magnificent one. Westfield was here in her strength. And in the simple matter of producing masses of locomotive fat, regular continents of beef, we may put a sign of equality between Westfield and all the rest of the Commonwealth, if not the world. Beyond dispute, some of the Westfield farmers are *great* in fat cattle. Look at the figures. Seth Bush presented here, three pairs, weighing respectively, 4,100, 4,400 and 6,000 lbs.! Charles Fowler had five pairs to match these several numbers: 3,600, 4,500, 4,700, 4,800, and 5,600 lbs.! Major George Taylor also exhibited a pair weighing 4,800 lbs. And the weight of the team of fat cattle from Westfield, 10 yokes, was 46,300 lbs.! Hatfield also appeared well. We think, therefore, we may safely affirm, that any

report that has yet been made this year, on fat cattle, will gain nothing in figures by a comparison with this exhibition.

The accumulation of 6,000 lbs., or even 5,600 lbs. of beef, under one yoke, is a sight but seldom witnessed. We labor under a sudden impediment of speech, when we seek words to describe such animals as were presented yesterday. We can think of nothing better than the *Behemoth* of Job, that "eateth grass like an *ox!*" Such specimens of *ox*-cidental grandeur we never saw before! We can only say, in taking leave of this subject, with the poetical biographer of John Gilpin—

"When next he rides abroad,
May I be there to see!"

And we wish to say here in a parenthesis, that the prospects of the two largest of these pairs of fat cattle will never *brighten!* When they have received their last in-*stall*-ments of feed, they will "lay their bones" in Springfield. So that the inhabitants of southern Hampden will have, at least once, the pleasure not only of paying for good beef, but of eating it. They are already sold to a dealer of the "infant city;" one will "grace an obituary notice" about the first of January, and the others after due intervals. We speak of this here, because it is *meet* that the lovers of good English beef should know it.

We next pass to the sheep. Knowing ones pronounced this part of the show exceedingly good. Sheep-raising has become almost a tradition in many parts of the Connecticut Valley. We doubt whether the change has been altogether for the better. We noticed many interested spectators around the sheep-pens, thinking, no doubt, of the time when Norval

"Penned the flock, and fed the fold."

New Oxfordshires and South Downs seemed to carry the day. Some fine specimens of the former, belonging to Lawrence Smith, of Middlefield, won universal praise. This breed is sometimes called the Improved Cotswold. They base their pretensions not so much on the fineness of their wool, as on the weight of their carcass. They thrive on ordinary feed, and grow with wonderful rapidity. A pair of twin lambs were exhibited, weighing at six months old, 94 and 114 lbs. Such sheep evidently find it less true than formerly, that "four quarters make a hundred weight," though it still may be as true as

ever, that "twenty hundred weight make a ton!" The full grown animals of this breed will generally yield an annual clip, each, of seven or eight pounds of wool. The South Downs are rather distinguished for the excellence of their mutton. A cross between the two, called Oxford-Downs, was also exhibited, which promises well.

Our duties as a committee also led us to the *sty* as well as to the *pen*. There was "a herd of many *swine*" in attendance upon the exhibition. Some of them from the beginning took a *deep* interest in the proceedings. They were evidently *subsoiling* the society's new lot. As this report has already occupied too much space, we will not *bore* you with many remarks upon this subject. We noticed one Italian hog, owned in Northampton, evidently a fine animal, but he did not meet our views; he lacked the indispensable appendage of *bristles*. Until he can use a little "hair tonic," and mend that matter, he should be referred, as a member of Congress once said of John Randolph, to the "committee on unfinished business."

We next met with the Suffolk hogs, which are evidently favorites in these parts. They are beautiful animals. They have small extremities, not too thick bristles; they have not large frames, and they take on fat more readily perhaps than any other breed. We noticed a male and female of this species, exhibited by T. P. Huntington, of Hadley. They received the well-deserved praises of all who saw them. The male partner in the concern evidently belongs to good society, for he was not *up* when we passed him at eleven o'clock. And this leads us to say that we have one accusation to make, even against this breed—*they will not root!* We shall lay up this charge against them. Any attempt to imitate "high life" by being lazy, is no recommendation, even in a hog. If you will allow us to use one large word in this report, we would say that it is one of the "idiosyncrasies" of a hog to *root*. Every regular animal *knows* how. A full-grown occupant of the sty, by the proper use of his "proboscis," will make from eight to twelve loads of manure in a season. The farmer then need not be alarmed at this propensity in his swine. Keep them well supplied with straw, leaves, turf, and the sour issues of the swamp, and they will transmute it all into agricultural wealth.

The exhibition of milch cows was not large, though some fine

animals were on the ground. Perhaps there was less superiority over former years in this than in most other departments. Nothing occurs to us of importance in addition to the report of the special committee.

The committee on town teams speak of these as having been surpassed in no former year. "The exhibitors have done honor to the show."

The special committee on miscellaneous stock remark, that in their department were found some of the most prominent features of the show. The herd of Mr. Lathrop consisting of a bull, six cows, and a large number of young stock, all thorough bred. Great thanks are due for their presence at the show.

W. C. Goldthwait, *Chairman.*

HAMPSHIRE.

Statement of William A. Stearns.

Cow and Calf.—My cow Juno, I suppose, to be about two-thirds Durham. She is an excellent milker, both as to the quantity and quality. Her mother, still thriving, is considered the best cow in Cambridge. Two years ago last May and June, for nineteen days in succession, she gave on an average, twenty quarts a day, measured milk, without the froth, in old milk measure, and nearly as much a day for a good while after. It was difficult to dry her up. She is now farrow, has given milk eighteen months, and still gives ten quarts a day. Thus much of the mother of Juno. Her grandmother sometimes gave twenty-two quarts a day, in the height of feed, as the mother also did occasionally. My cow, though uncommonly good, has never equalled either of them. She has distinguished herself above her progenitors by the very large size of her calves.

The calf which I present herewith, was dropped on the 20th of August, and accordingly, will be seven weeks old on the first day of the fair. He was taken off from the cow about the third day, and has been fed chiefly on skim-milk ever since. He now eats some grass, and sometimes takes a little meal with his milk. He was sired by Mr. Sweetser's full blood Ayrshire.

HAMPDEN.

From the Report of the Committee.

Milch Cows.—The committee on milch cows, in presenting the result of their action upon the duties referred to them, respectfully submit a few preliminary remarks, which the importance of the subject involves, and with the hope that they will not be considered as obtrusive. The duty of executing the purpose of the society, in dispensing the premiums for the best milch cows, is of more importance to the whole community than will be seen at the first glance. What constitutes the best milch cow, is a question still involved in doubt. So diversified and conflicting are the opinions of men of acknowedged judgment and skill in stock breeding, that no fixed standard or well determined rule has yet been established by which an examining committee can be governed in arriving at just conclusions. And here we may ask, if the best cow is that, which, in view of a premium, has been pampered by extra care and feed, and thus forced to yield an uncommon flow of milk during the ten days of trial required by the society ? Or is it the cow whose superior quality of milk has yielded the largest product of butter within the specified time ? Or is it the animal whose ponderous frame carries the greatest amount of flesh, and offers her pedigree of blood, rather than the product of her milk or butter, as her credentials, that constitutes the best specimen ? Either of these might receive some well-deserved premium, and yet leave the question still undetermined. If we receive as our guide the opinion of one whose practical experience and close observation qualifies him to speak decidedly to this point, who says, " The excellency of a dairy cow is estimated by the quantity and quality of her milk ; and the quality of her milk is estimated by the quantity of butter it will yield," we shall follow the most suggestive deduction from the interrogatories furnished by the society to all competitors upon milch cows, for the purpose of reaching such results.

The great difference in the quality of milk from different animals of the same herd, is most clearly established and demonstrated by the experiment of John Holbert, of Chemung, New York, having a dairy of forty cows, whose daily product of

butter was thirty-nine pounds. Desirous of reaching the very facts your committee are now searching for, he tested the merits of twenty of his cows, by measuring, weighing and churning the milk of each, separately. The results were most satisfactory. He thus discovered the real value and individual character of each animal for butter products. By this experiment, he learned the fact which every judicious person engaged in the dairy business should possess by a similar trial of his own herd: he found that twenty-nine quarts of milk from cow No. 13, gave him one pound and fourteen ounces of butter; that twenty-five pounds from No. 2, afforded but ten ounces; that seventeen pounds from No. 16, yielded but eight ounces; that No. 15, with a yield of sixteen pounds, gave twelve ounces, just precisely the same amount of butter as that of No. 13. Thus we find that the twenty-nine pounds of milk drawn from No. 13, were equal to fifty-nine pounds given by the three other cows. How many such unworthy animals may still be found within the limits of our own society? Each of them count one, 'tis true, and in the herd, divide the honors equally with the best. The experiments here quoted, offer a profitable hint to those who purchase their daily supply of milk, and determine also, that the cow which gives the largest quantity of milk is not always the best milch cow.

Let us now examine the records, and exhibit a few instances of those whose superior milk and product of butter, give positive evidence that a clear and discriminating selection of cows should be made for the dairy. We will first adduce the Sussex cow, a foreign example, we know, but referred to because we think the record of the past should no longer be quoted as a maximum for the present, or the future. We earnestly desire that the progressive age in which we live, should bear upon its record some agricultural statistics which will sustain the declaration, that it is indeed the age of improvement and of progress. The cow to which we refer, exhibited a record, showing that in fifty-one weeks and four days, six hundred and seventy-five pounds of butter were made from her milk; and continuing the trial to prove the capabilities of the animal to sustain so heavy drafts upon her productive qualities, we quote the entire product of this cow for four consecutive years and five weeks, amounting to an aggregate of two thousand seven hundred and twenty-five

pounds of butter during that time. We might introduce many instances of an approximation to the above result, in one year's trial, in the history of our own annals, and in a shorter period, even a larger amount; but the ephemeral instances which we might quote, of three pounds per day for one or more days, or the remarkable products for a month, or a week, unless supported by a longer trial, will hardly remove the impression that such products are the result of extraneous causes.

Such are a few only of the many instances we might name in exhibiting the capabilities of the best milch cows. As a standard, however, it may be considered too high for general adoption by our farmers; but as "two forty" is to be the speed of the horse, so we desire the above statement to be considered in relation to the future record of our dairy products. When our farmers will become as intensely interested in obtaining such cows, as is the jockey in securing his fast horse, treating them with the same requisite care to reach the standard mark, then, and not till then, shall we possess a breed of *fast cows*. Yes, when public opinion will lead the great mass of assembled citizens at our annual festivals to press forward to examine a cow, whose daily products administer so many comforts to their daily wants, and testify their admiration with even less enthusiasm than is produced by the over-taxed exertions of the horse, to gratify a mere animal appetite, we may then expect to see a true appreciation of the useful, above the fascinating.

Our remarks have thus far been directed to the inquiry as to what constitutes the best milch cow? We have cited authorities showing some very remarkable instances, in which we can read our directions to success. But there is another point from which we can see the animal, and an opportunity to redeem the character of a good milker whose milk is even below a fair average of butyraceous equivalents. It is, we believe, a prevailing opinion among the most experienced dairy-men, that it is not the richest milk that gives the greatest amount of cheese, or that will make the fattest veal. How this theory can prevail and be strengthened by experience, standing as it does, directly in front of science, we can hardly understand, unless the loss occur in the process of cheese-making. The instance we quote in this case may support the theory. Mons. Le Feuvre, of La Houge, Isle of Jersey, tried the experiment with the rich milk of his

Alderney cows;—"he found that the quantity of milk necessary to produce a pound of butter, afforded one pound and a half of cheese; and from the quantity of milk which produced twenty pounds of cheese, the drainings of the curd and whey being churned, yielded four pounds of butter inferior for table use, but superior to any other for making pastry, being harder and keeping longer than other butter." So great a loss, we believe, is not generally sustained by dairy-men at the present day, the cream being secured before the milk is set for curd.

To give a better understanding of the superior and inferior qualities of milk, we present a few cases of scientific analyses, with the understanding that casein represents the cheese equivalents: the others are familiar to all. The first experiment was tried in Albany, with the milk of a Jersey cow, owned by J. A. Taintor, now residing in Hartford, Ct. The milk, which was sent to Albany by express, had a specific gravity of 1.0313, possessing the following equivalents: water, 84.73; butter, 8.07; dry matter, 16.27; casein, 5.02; sugar, 3.05; ash, 79. Prof. Thomson, of Glasgow, under the direction of the British government, furnished the following results from the milk of some Ayrshire cows: specific gravity, 1.029; water, 87.19; dry matter, 12.81; butter, 3.70; casein, 4.16; sugar, 4.35; ash, 59. Common milk, as compared with Jersey or Ayrshire, exhibits the following composition: water, 90.48; casein, 3.88; butter, 2.88; sugar, 2.78. In this connection, we present an interesting analysis of skimmed milk, so as to show the properties of all kinds in contrast, viz.: water, 97.875; casein with a trace of butter, 38; sugar of milk, 35; muriate of potash, 1.70 in 1,000; phosphate of potash, 25 do.; lactic acid with acetate of potash, 6 do.; earth phosphates, 30 do. By contrast: Jersey milk—butter, 8.07; casein, 5.82: Aryshire milk—butter, 3.70; casein, 4.16: common milk—butter, 2.88; casein, 3.58: skimmed milk—a trace of butter with 3.8 of casein.

After giving the foregoing statements of the constituents of milk, we desire to furnish some references by which to justify our position, that indifferent milkers, in relation to their products of butter, may redeem their character in the cheese-room. It has, until a late period, been considered a fair average of a dairy aggregate, that would yield one hundred and fifty pounds of butter, or two hundred pounds of cheese per annum, for each

cow in the herd. But since the proper application of the mind has been directed to the science of *cause* and *effect*, as pertaining to this subject, such has been the progress of successful experiment, that not less than five hundred pounds of cheese for each cow in the herd is considered satisfactory; and of such we have many instances before us. But as *excelsior* should be the motto of every farmer, we will quote but one instance here, and that only to raise our motto to a point where our Hampden farmers may all see it, and feel it a pleasant duty to attempt to give it another hoist. The instance we refer to is adduced in a statement to the New York State Board of Agriculture, by Alonzo Fish, Esq., of Herkimer county, in which he says: "The average yield of my dairy, in 1844, was seven hundred pounds per cow, market weight; in 1845, average yield, seven hundred and seventy-five pounds per cow, weighed daily from the press."

In regard to the quantity or the quality of cheese, as depending upon the food of the animals, your committee were not called upon to decide; but very much of the good character of its quality may depend upon this point, if the remarks of an ancient writer upon (English) Cheshire county cheese, so long celebrated for its superior quality, are entitled to any consideration. He says: "It doth afforde the best cheese for quantitie and qualitie, and yet the cows are not, as in other counties, housed in the winter: some essaied in vain to make the like in other places; though from thence they fetched their kine and dairie maides; it doth seem they should have brought their *ground* too, wherein is surelie some occult excellence in this kind, or else so good cheese will not be made."

These instances of the productive capabilities of the cow will suffice, until some more fortunate committee upon the milch cows of Hampden county shall have the pleasure of awarding the premiums of the society upon a larger product. Your committee have endeavored to avoid any expression of personal preference in regard to any particular breed of cows for the dairy. The conflicting opinions of those interested in the several distinct breeds, and the frequent public challenges given to decide the pre-eminence of favorite stock by a fair trial of productive qualities, has not yet determined the question any

further than individual preference, and here it is prudent to let the subject remain.

Never before have we been gratified with the sight of so large a number of milch cows, considered either in relation to their intrinsic value in dollars and cents, as herd book animals, or in respect to their estimated productive qualifications for the dairy. The whole number of entries in this department comprised sixteen single cows, and fifty-three entered as herd cows.

First on the list, was a group of fourteen splendid full blood Durhams—a mother with her descendants, to the second generation, her youngest but three days old, yet proud of its paternity, and exhibiting in full view with the older members of the family its own ticket of age, and its affinity to a long line of pure blooded ancestry, from undisputed records. The matron of this family dates her genealogical record from Miranda and North America, and upward through the blood of Frederick to Young Denton, North Star, Comet and Henry to Danby, on the paternal side, and claiming maternal descent, by only three removes, from the celebrated and imported Arabella. She has reared seven heifer calves, six of which have become mothers; eleven of these sustain their mother's title of Yarico, numbered from one to twelve. Young Yarico the 3d, in view of future honors, gave birth, in April last, to a bull, which is recognized under the poetic cognomen of *Hiawatha;* and the old dam, as if proud of the title, only three days since, added one more, to bear the title of Hiawatha 2d—both of these claim Kirkleavington as their illustrious predecessor. All these were exhibited by Wells Lathrop, Esq., of South Hadley. It would be superfluous for your committee to record their feelings of admiration of this herd of superior stock—feelings consonant with the expressed opinions of thousands of admiring spectators. The devoted services of the Messrs. Lathrop, for the last several years, in time and money, to introduce, with discriminating care for improvement in valuable points, and especially in dairy qualities, a choice breed of animals, which would concentrate all the prominent improvements made in the distinctive families of Durham blood, entitle them to the gratitude of the community rather than the compliments of your committee, who are not privileged to make an award upon this herd. The directors, we

learn, have unhesitatingly and unanimously awarded a silver pitcher, of the value of $15, to Mr. Lathrop.

We next come to nine choice animals, belonging to Phineas Stedman, of Chicopee, of which two were recognized under the blushing yet fragrant name of Rose, one of ten years, with White Rose, as her calf. Arabella 2d, of ten years, Atalanta do., Lilac of six years, young Dorothy, five, and Eva of four years—highly prized animals, whose names are in the herd book—form the nucleus of the future exertions of Mr. Stedman, in rearing and improving the dairy stock of Hampden county. His liberality of mind and purse in securing several of these cows at $200 each, should be appreciated.

J. H. Demond, of Springfield, exhibited twelve choice animals, all well selected grade stock, in which are blended a judicious cross from the best dairy stock in the country.

Sumner Chapin, of Chicopee, offered six, selected from his herd, all dating their origin from the stock of the late Col. Abel Chapin, whose careful judgment and discrimination in the selection of his stock, like the mantle of Elijah, has fallen to his successor. George M. Atwater, of Springfield, exhibited four Durham cows, either of which, upon individual competition with others, would have won a premium. Major Briggs, well known as having the best horse, the best cow, and the best swine, could not resist his prompt disposition to be there from the farm of Chester W. Chapin, in Chicopee, which is under his management. The Major added nine, including two Durham and Ayrshire heifers of much promise. With these we mention, as a climax, the cow exhibited by Reuben Sikes, of Ludlow. She was nine years old, and since the 25th day of January, 1853, has added eight calves to the herd of her owner. Seven of these came with their mother to the exhibition. This unusually productive cow has had twins annually, since the above date. As no premium was provided for such results, we could only make our best bow, and return our thanks, as we now do to those who have accompanied us through this review of the examination of milch and herd cows.

Francis Brewer, *Chairman.*

From the Report of the Committee.

HEIFERS.—When we consider the number of animals raised, and the amount of capital invested in this enterprise, that, in 1850, according to the census report, there were 18,000,000 head of neat cattle alone in the United States, and in Massachusetts 259,994, and in our own county of Hampden 21,755, valued at $794,359—an average of $36.51 per head—when we consider their utility in supplying us with not a few of the necessaries and luxuries of life, we may have a better idea of the importance of bestowing great care and attention in selecting and rearing the best animals.

The object of having good stock should be two-fold with every farmer: First, it conduces to increase the contents of his pocket, which, at the present age, is no trifling consideration, it being the paramount one with not a few individuals; and secondly, it forms a source of rational enjoyment by no means to be lost sight of, in affording an opportunity to exercise that finer taste for beautiful objects, which every one should be happy to cultivate. And certainly no one has a better opportunity of so doing, than the farmer. The poet Virgil, who was a farmer of no mean attainments, narrates to us of two shepherd swains, who, in olden time, contended with their rustic pipes. A heifer was the prize of melody and song, possessed of the beauty of a fawn and gentleness of a dove. The order of exercises is at present reversed, and instead of rustic swains contending with songs for a heifer as the prize, they present their heifers with expectations of a prize, which sometimes proves valueless as a song. The historian of the United States declares that no occupation is nearer heaven than agriculture. It certainly, then, behooves our brethren to conduct themselves with the greatest propriety and decorum, and it is the opinion of your humble committee, that one of the best modes of exercising the finer feelings of humanity and cultivating a kind and generous spirit, is rearing calves. Commend us to a man who has a pride in his herd, who uses good judgment in its selection, and bestows care in providing for their peculiar wants, thus showing that he appreciates the blessing of having them to use, not to abuse,—and be assured that such an one will be found possessed of those

higher qualities of heart which elevate man above the brute creation.

In closing their report, the committee would express their pleasure at the manifest increase of pure blood, as indicated in the animals presented for their inspection, bearing evidence of increased attention to the valuable qualities of animals which have been especially cultivated in thorough-breds for successive generations, thus giving them a far more reliable character. We commend this subject to the earnest consideration of our fellow-laborers in Hampden county.

Moses W. Chapin, *Chairman.*

FRANKLIN.

From the Report of the Committee.

Milch Cows.—Your committee regret, that they are obliged to report so few entries for premiums on cows. Although there were a good number present, there was but one competitor, who complied with the requirements necessary to obtain a premium. It certainly is but little trouble to weigh the milk and butter of one cow, for one week, and give statistics which are to be the general guide for the committee. Your committee are well aware, that a good stock cow is not always a good dairy cow; and a good dairy cow may be a poor cow for stock, and it is rather difficult to have the qualities of a good stock and dairy cow combined in one. For this reason we would recommend that there be a premium offered for the best stock cow with a specimen by her side.

H. Hawks, *Chairman.*

Statement of Ira W. Barnard.

Dairy No. 1, five cows. White cow came in April 25, 1855—age, 9 years. Dark red and white cow came in December 24, 1855—age, 4 years. Light red and white cow came in January 8, 1856—age, 4 years. Dark roan cow came in March 25, 1856—age, 10 years. Light roan cow came April 8, 1856—age, 7

years. Feed, nothing but common pasture. Breed, three-fourths Durham. Go dry from eight to ten weeks.

Quantity of milk for one week ending June 11, 1856, 1,148 lbs. Butter made from same, 45 lbs. Cheese made from same cows one week ending June 28, 106 lbs.; during this time, milk and cream from the above-mentioned dairy was used freely by two families of four persons each.

The best cow of the five came in more than thirteen months before the trial, and was to come in again in less than five months, which would have made, with the milk used in the two families, a difference of 5 to 6 lbs. of butter, and 12 to 15 lbs. of cheese, making the result—butter, 50 lbs.; cheese, about 125 lbs.

From the Report of the Committee.

STEERS.—The committee on three and four year old steers attended to their duty of examining stock at a late hour, on account of circumstances beyond their control. There were nine pairs of each came under our examination, and one pair of each that had no weight given, consequently there were eight pairs of four year olds which averaged thirty-six hundred and eight pounds the pair, and the heaviest pair weighed forty-three hundred pounds; of the three year olds, the average weight was thirty-one hundred and sixty-eight pounds, and the heaviest pair weighed thirty-five hundred and ninety pounds. Your committee are of the opinion that the meal dish must have been used to accomplish such results as the above. We think the above shows that the farmers of Franklin county are not in the back-ground in raising stock, if they are in other farming matters. We should be glad to impress upon every farmer the importance of giving his stock, great and small, a reasonable supply of meal during the winter season. It will not be lost, but appear in good beef in due time. We would also recommend every one who keeps stock, to give them during the foddering season as much hay as they will eat, at regular intervals during the day. We venture to say, that if you ask the breeders of good stock here to-day what rules they observe in regard to feeding, they will tell you it is at regular hours, whether two or three times each day, and as much as they will eat.

JAMES CHILDS, *Chairman.*

Report of the Committee.

Cattle for the Stall.—Your committee found nine entries of cattle for the stall, all of which reflected credit to the owners, and were highly creditable to the show; and as they passed the array of cattle arranged in the several teams, noticed with pleasure the large number bearing prominently those points and features that are now conceded as established principles for profitable feeders.

Your committee regret that but one of the competitors complied with the regulations of the society in regard to furnishing statements of the manner and cost of the feed of their animals; but as the owners were with the cattle, and ready to give the committee any information required, that was allowed as a substitute.

Thos. J. Field, *Chairman.*

Report of the Committee.

Heifers.—Your committee having attended to the duties imposed upon them, rendered more onerous by the discharge of the committee on heifer calves, which rendered their labors doubly arduous, yet feeling unwilling to evade the responsibility, submit the following report:—

As many greater and wiser than us, have written upon the improvement of neat stock with great success, we do not flatter ourselves as being able to elicit any thing new; yet, feeling the subject to be one of great importance, it being a law of nature that like produces like, as is the undeveloped germ, so will be the future reality, we feel inclined to add a few hints, which, if it does not "elicit any thing new," may yet revive old impressions, and serve to refresh the memory.

While much depends upon the origin and breed of heifers, we are of the opinion that the manner of rearing, training and cultivation of the same, exerts great influence in the final development. While no good farmer will neglect to use proper care in the management of his stock, yet there are kinds of food particularly adapted to the development of milking properties, and at the same time maintain a healthy and vigorous growth of the

animal. To this end, we prefer roots, oats, and the like, to Indian corn; for while the one will develop milking qualities, the other will produce excessive fat.

Experience proves that a gentle, docile animal will give a greater quantity of milk, and improve more with the same quantity of food than one of opposite nature.

Many farmers are not particular enough in the selection of calves. Indeed, we hesitate not to say, that as a general rule, there is more loss in their not using proper care in the selection of the calf to be raised, than in any other way. It is certainly far better to pay a high price, for a superior calf, than to be presented with a poor one. Not raising a good calf because the farmer could not afford the expense, is too much like the farmer who used his cart wheels without the tire, because he could not afford the price of iron. The committee would close their remarks by expressing much gratification at the general appearance of those entered for premiums, both as to beauty and size. Our regret is, that while Messrs. Fisk, Peck, Anderson and May, seemed to vie together in a generous emulation, there was not a greater number to emulate their zeal. Certainly there are other farmers in Franklin county, who might, if they would, be contributors to our annual fair, doing great honor to themselves, while adding to the happiness and prosperity of the community.

DEXTER CHILDS, *Chairman.*

NORFOLK.

From the Report of the Committee.

MILCH COWS.—In the book containing the premiums and the rules for awarding them, there are two sections relating to cows. The first offers a premium for the different breeds, without requiring any written statement. The second, headed milch cows, requires a particular description, in writing, of the expense of feeding, and the quantity and quality of the milk at different times. At the late exhibition, nearly all the cows entered for premium might, with propriety, have been called milch cows, many of them having calves with them. They respectfully

recommend that all competitors, for the future, be more explicit in making their statements.

The increasing demand for milk, the rise in the value of land, and the present high price of labor and produce, in the vicinity of our cities and villages, it would seem, ought to be a sufficient inducement for farmers to pay more attention to the breed, expense of keeping, and manner of milking their cows.

They should be fed and milked regularly, and if practicable, by the same person; and when the number of cows requires more than one milker, each person should invariably milk the same, as a cow will yield her milk more readily and freely to one with whom she is acquainted, if kindly treated, than to a stranger.

Yankee ingenuity has invented almost every thing to save labor, but whether a machine better than the hands will ever be invented to draw milk from the udder of a cow, remains to be seen.

Probably, as a general rule, the most profitable age of a cow is from six to twelve; some, however, arrive at maturity and decline at an earlier age than others. The writer of this report once owned a small native that gave sixteen beer quarts per day for several months, after having her second calf, and although kept till twelve years old, she never exceeded that quantity. It may not be improper, in this connection, to state that there is now, in the west part of Milton, a cow in milk that was raised and has always been owned by the same person, that was twenty-three years old last March.

ELIJAH TUCKER, *Chairman.*

HORSES.

ESSEX.

From the Report of the Committee.

Colts.—There were a great number of colts of various colors, shapes and sizes, presented for the inspection of the committee, those with forms adapted to the peculiar duties for which the horse is intended, some for the plough and others for the road; and it is a matter of great difficulty for any committee, to make a satisfactory or even a correct report, and one upon which they should most assuredly receive more definite instructions. For instance, they are authorized to offer a premium for the best four-year old colt, another for the best three-year old, and still another for the best yearling; now upon what basis must the decision be made, when there are evidently almost as many different duties which these colts would be called upon to perform, as there were subjects for inspection? There were those which would only be fitted for the natural and ordinary work of the farm, others whose shapes destined them to be the roadsters, while still another class would perform the duties of the "horse of all work." Now is it not proper that each one of these should receive attention? They are all useful, each in his own sphere. The committee would ask that there should be a classification made with colts as has been done with horses; that is, there should be two premiums offered for the two best colts, say of four and of three years old, whose peculiar characteristics showed them to be destined either for the road horse or for the plough. They are both useful, each in his own way, and as such, whichever will be most profitable to raise, will receive the attention of the breeder. It may be argued that at so early an age, it is almost impossible to decide the many and the different services for which these young animals would be trained. This may, in a measure be true, but at the age mentioned, the young horse ought to have some instructions as to his after life, and the committee regret that so few of the many colts presented were broken to harness—not that they would argue too early breaking—but at the age of three or four years the colt, by a

little training, would be better, and the owner himself, in showing him, would reap the benefit. At the late horse exhibition in Boston, was quite a number of two-year old colts, entirely broken to harness, driven around the track for half a mile, received premiums for trotting, and would never, in any degree, unless over-taxed by improper masters, be harmed.

The committee regretted exceedingly, to see so many colts offered for their inspection with evident marks, even at so early an age, of unsoundness; showing the carelessness and even the wickedness of the breeder, in rearing colts from spavined or ring-boned mares and stallions. It is too often the case that the farmer, after having obtained the service of the mare for fifteen or twenty years in the hardest of drudgery, thinks that she ought to remunerate him still further by rearing him a colt; he either does not see, or does not know, that the old mare is spavined, the consequence perhaps of long and faithful service at severe pulling and straining. The colt is foaled; its owner will not, perchance, immediately witness the effects of his folly; but when the colt is of sufficient age to be put at work, he will soon show how useless and abominable is the practice of breeding from old and entirely worthless animals. The committee do not wish to be understood that colts thus reared will *always* be foaled spavined, but that there will be a predisposition to this unsoundness. Breed from none but young, healthy and sound parents, and in the brute as well as in the human species, healthy progeny will be the result. Let the mare be raising her family during her youth, while she is most fitted for this duty, and when old let her rest from having her nature so severely taxed.

There is no doubt that the farmer, the county and the Commonwealth would be benefited, if a law was passed prohibiting the breeding from worthless, and particularly from spavined mares. This committee have been informed by a gentleman who has great interest in this matter, that in his passage through one of the principal streets of our metropolis, he counted no less than fifteen spavined horses out of twenty-five. Is this the right state of things? Ought this to receive the sanction of any community? Surely not.

The committee earnestly ask that a classification may be made, and that premiums should be offered for the different kinds of

colts. It certainly will be beneficial to the society, as well as to the raiser of stock. There will always be those who will breed horses for farm and other heavy work, and also those who will feel interested in the roadster. It is not possible or well that both of these classes should be combined in one ;—their duties are different, their temperaments and forms are unlike, and both are undoubtedly very useful. For instance, the mare that received the first premium,—she was only four years old, and personal proof was shown two of the committee, (one of whom rode six, and the other over twenty miles with her,) what careful breeding and excellent training would do, even to so young an animal. This colt, during her whole journey from Newburyport to North Andover, never showed a slower gait than nine miles the hour, (and that, too, without the whip or voice,) and at the end of the trip was as fresh as at the commencement. As another example, on the other side, a colt was presented for the same premium, of as different a nature as possible, which could not have performed this journey with such ease, but for the ordinary work of the farmer or the hack could have no superior. These examples will readily show the necessity of proper classification in regard to premiums.

On the subject of breeding, the first axiom is, that "like begets like;" and there is scarcely a disease which belongs to the parents, that may not be transmitted. Hundreds of instances are on record where, in either the sire or the dam, marks of unsoundness, such as spavins, ring-bones, curbs, roaring, &c., could be seen; these same marks were visible also in the offspring. Peculiar formations and constitutions will also be inherited, and oftentimes, no matter how beautifully formed or how graceful the gate of the sire, the colt will take the ill-formed and homely step of the dam. There should always be some good points, even of a different character in both, and we shall be likely to receive good stock.

There is nothing of more importance, after the colt is fairly in this world of speed, than that he should at once receive attention. Let him at first be kept with the dam, in a warm stable, and as soon as sufficiently strong to be upon his legs, let him follow his mother about in her ordinary slow work. Exercise will be better for both; but the practice of allowing the young creature to accompany its dam into our large towns or cities,

ought to be condemned. It is undoubtedly a good and feasible plan to allow the colt to be with its parent as much as possible, that he may by degrees get wonted to objects about which he will naturally live, but keep him from following the mare into town, for often you will see the colt frightened by mischievous boys, or bitten, or nearly worried to death by dogs. The colt darts from one side of its dam to the other, under her legs and often under the wagon wheels, alarmed perhaps at some urchin who is trying one cracker from his ten cent bunch, all prepared for the next fourth of July; or the little fellow is struck by the wheel, (unnoticed by the driver,) against which he is endeavoring to seek protection from some miserable cur; perhaps he receives a blow which does not immediately attract attention, but in after life it will not fail to produce trouble. There is nothing of more importance than that the young horse should have not only good and careful treatment, but should also have his growth encouraged by a liberal supply of bruised oats or bran, and his owner may rest assured the strength and power of the horse in after life will depend greatly upon whether or not, in his youth, the colt has been allowed proper nourishment.

The education and the breaking of the horse should be as that of the child; let his early lessons be made pleasant; keep the whip as the last resort; be firm, yet mild. The ugly disposition in the horse, ninety-nine cases in a hundred, is put in him by improper treatment, and by his being managed by rude or careless hands. Let his teacher, therefore, be one of kindness and patience,—such an one as we should select for our children.

The late horse exhibition in Boston, shows the propriety of raising none but superior stock. If we all are unable to raise an "Ethan Allen," or a "Flora Temple," let it be our aim to come as near them as possible, selecting none but the best of stock, and rearing them with proper care. These exhibitions are certainly useful, and those who are engaged in getting them up are entitled to great praise, for it will not be doubted that, next to the improvement of the human race, the horse claims our attention. This exhibition will not be without its good influence amongst the farmers, and will show that they know their own interest as well as any other class of men,—that it is just as easy, and much more beneficial, to raise horses which will sell as high as they were sold at the late show, a four

months' old colt, sired by Black Hawk, selling for $1,000, and a yearling for $2,000. The farmer, it is repeated, knows his interest, and will not be slow in taking advantage from the exhibition just closed; and we cannot better finish this article than by using the words of a writer in the Boston *Transcript*, who says: "On the comparatively unproductive soils of New England, mere farming is the least remunerative of the different classes of occupations into which the community is divided. It is impossible for the majority of farmers to make more than a bare living from the tillage of the earth. Some means of profit must be superadded, perhaps not exactly included in the general term of agriculture. Horse-breeding is one of these. We suppose it will not be denied that the hills and moors of New England are better adapted to grazing, and consequently the maintenance of the equine family, than to other agricultural purposes. Any thing that turns the attention of all farmers to this subject, is, then, of direct importance to these busy producers.

"The mind of the agriculturist being directed to the raising of horses, it is of the last necessity that he should be acquainted with the best varieties,—those of the highest money value because of their fleetness, as well as the species that are the most valuable for immediate practical uses, draught, &c. Certainly no easier or cheaper way for the diffusion of this sort of knowledge can be devised, than by the exhibition of the finest blood horses in one grand collection, where the spectator can have before him, at one glance, all the country can boast in the equine department.

"But there is one controlling consideration why horse fairs should become an institution in our land, arising from the fact that our people are blessed with too few periods of relaxation and repose. As a consequence, the population wear themselves out in one-third less time than would suffice, were it not for the unceasing activity and constant restlessness that prevail. If by making these displays of the noblest of the domesticated tribe, of annual or periodical occurrence, any increase whatever can be added to the list of holidays, who will not favor them?"

SAMUEL C. OLIVER, *Chairman.*

From the Report of the Committee.

STALLIONS.—The committee on stallions submit the following report:—

There were five stallions entered for premiums, and three for exhibition. Of the latter class, the horse, "Trotting Childers," owned by Lambert Maynard, of Bradford, and which received the first premium of this society, at their last show, was pre-eminently the best stock horse exhibited; and the committee believe that they can confidently recommend him to breeders, as a stallion possessing more good "points," and better "blood," than any other stallion now owned in Essex county. The committee regret, as the society, with a commendable spirit of liberality, have raised the premiums on all other animals, not excepting the Shanghaes and Chittagongs,—that the premiums for horses alone should remain stationary. Justice compels us to bespeak for the noble horse some recompense for this seeming neglect; and we respectfully beg leave to suggest to the trustees, the propriety and importance of extending their liberality to these noblest animals of the brute creation.

The idea seems to prevail to some extent among the horsemen of our country, that the breeding of their favorite animal is not receiving sufficient encouragement at the hands of this society. And we have reason to fear, if some action is not taken on this matter, that horses will be withdrawn from our exhibitions, and thereby detract very much from their interest.

In this country there is no branch of agriculture that needs encouragement more than horse-breeding,—none so little understood, none so sadly neglected, and yet none, when properly conducted, that is more remunerating.

The country is flooded with miserable apologies for horses; but how seldom we meet with a perfect horse,—or if, perchance, we occasionally find one, who can afford to buy at the price which is asked for him? There should be some remedy devised for this state of affairs. We want the aid of this society to disseminate knowledge in regard to the great and important subject of horse-breeding, which is so little understood among us. The fact is, not one farmer in ten understands the first principles of breeding, or hardly knows a good horse from a bad one.

Most of them will keep their mares until they are fairly worn out with hard work, and lame in every limb, and then, if they can find a stallion well loaded with fat, who can prance, and squeal, and hold up his head, provided his services can be procured for four or five dollars, they commence their first lesson in breeding. Mark the result. The foal is born, a miserable, unsound, unsightly mongrel. He lives, five or six years, perhaps, and sells for fifty or seventy-five dollars. Our "scientific breeder" finds himself some fifty dollars "out;" says there is no profit in breeding horses; becomes a perfect hater of the equine race, and quits the business in disgust. This is but a true picture of horse-breeding as generally conducted. Does it not need encouragement and protection?

Again, a farmer has a young, sound, good blooded mare. He takes her to a stallion whose general appearance is fair; of his origin little is known; nevertheless, he enjoys a good reputation. Let us look at the result in this case. The foal comes limping into the world, a ring-boned, spavined, useless thing. To the owner this seems perfectly mysterious, but to the initiated the reason is obvious, for the sire descended from an unsound, ill-bred race of horses, and the colt has partaken of the faults of his ancestry. Here we see that "blood will tell," and that it is never safe to breed from stock whose origin is unknown, be its general appearance ever so good. In England it is not considered safe to breed from horses whose pedigree cannot be traced for at least eight generations.

Pedigree is the sheet anchor of the horse-breeder, and without it he never need hope for success. If the object of the breeder is to obtain the highest prices for his colts, we would unhesitatingly say to him, breed for speed; try for the colts that sell for one thousand dollars at three months old. But we would admonish him of obstacles which he must inevitably encounter; we would remind him that he lives in puritan New England, where little distinction is made between the gentleman who owns a fast horse and uses him for his legitimate business or amusement, and the gambler who makes racing his profession. But, nevertheless, if he possesses a fair share of courage, he will not find it difficult to overcome these obstacles. Popular opinion will rule, that a man may make his business respectable if he first learns to respect himself.

The speed of horses, in all ages, has been a matter of admiration; and racing is coeval with their subjection to the use of man, and will cease only to exist, when in the grand race of time, both rider and horse shall have

"Turned down the 'home stretch,'
And reached the last 'goal.'"

JOSIAH CROSBY, *Chairman.*

HAMPSHIRE, FRANKLIN AND HAMPDEN.

From the Report of the Committee.

ON HORSES.—The society, at a liberal expense, have purchased a lot for the purposes of their exhibitions, well adapted to all their wants. They have prepared a course upon it for the exhibition of horses, and as a pleasure ground for spectators. All who witnessed the show upon either day, can attest to the peculiar fitness of this purchase. And after the society had suffered and struggled for so many years, for the want of even a tolerable place to exhibit and test the qualities of horses,—to be ushered at once into an arena so beautiful in itself, and so fully suited to this attractive and desirable part of the fair,—all of one accord spoke out in praise.

Upon the track at all times could be seen an attractive display of horses of every speed, kind and value, while at the same time all sporting was suppressed, except such as was believed to partake vastly more of the "useful than the ornamental." Trials of speed in trotting were had, and were duly considered in awarding the premiums. The fancy class of horses was not numerous, nor were those on the grounds allowed to take improper liberties with the track.

Few stallions were on exhibition, but those offered were of the very first class in all points, and the committee were almost unwilling to decide, by awarding one a premium over another. Those who saw N. R. Washburn's, and Strong & Lewis's stallions moving so fast and majestically over the course, will long retain that spectacle in their memories, and the society are under many obligations to the owners for their appearance here.

And this part of the exhibition will be lastingly felt, for having awakened throughout the community a new interest upon improvement of horses, and we have no doubt that many of the colts and horses which will hereafter take premiums of this society will be the descendants of these same horses. Mark it.

Breeding mares were numerous. Many were our best young and middle aged ones. This is another reason why we are sure, in future, of having superior and more valuable horses raised in this community. Too long has the community been afflicted with the progeny of poor, old, broken down mares.

Colts, under one year of age, were out in large numbers, and none of them, woolly-haired, faded, hollow-backed and drooping, as were all the young colts to be found in this region a few years since.

Now, if there are those in the county who wish an innocent holiday, and have not attended the horse show of this society, let them all be present at the next annual exhibition, and ever after it will need no suggestion of this kind to take them there. We saw all over the grounds, our conservative and worthy old citizens, and shall see them there again. We also saw long rows of seats filled with the ladies of the town—in all their fashion—and farmers' wives and daughters from the country, with their healthy countenances. Ever may we see them there, glorying in the products of an agricultural life.

PLYMOUTH.

From the Report of the Committee.

The committee on saddle and trotting horses report that premiums were offered for the best horses for trotting and saddle, owned in the county. In judging the trotting horses, the same rules cannot and should not prevail at an agricultural fair, which are decisive upon the race-course. Upon the turf, speed alone is the desideratum, and the fastest horse wins the prize. But your committee are of the opinion, that they are bound to regard age and capacity, in awarding the prizes here given, and have based their report upon these considerations as well as

speed. Your committee further beg leave to state that, believing it is one of the objects of the society to encourage the raising of good breeds of horses, for all the various purposes of usefulness, but not to encourage the keeping of horses for the turf, they would recommend the following rules with regard to the entry of trotting or travelling horses, hereafter.

1st. No horse shall be entered that has been driven for money.

2nd. No horse shall be driven by a professional turf-rider or trainer of horses.

By establishing these rules your committee are of the opinion that racing for money will be discountenanced, and that more entries will be made by persons now discouraged from fear of competing with professional turf-riders.

CHARLES G. DAVIS, *Chairman.*

SHEEP.

HAMPDEN.

From the Report of the Committee.

Never since the formation of the society, has there been so fine a display of sheep, both in numbers and quality, as was found on the present occasion. The number included six flocks, four single bucks, and twenty-three single ewes—in all, seventy-eight. The statements of some of the competing parties, herewith submitted, will convince unbiased minds that there is no stock more productive to the farmer than sheep of desirable blood.

T. J. SHEPARD, *Chairman.*

Statement of Samuel Beebe.

The amount of income realized by me on the sheep which I offer for premium, is enumerated in the following statement:—

The quantity of wool sold from six of these sheep, for the year ending in September, 1853, was 26½ lbs., at 52 cents, $13.78; six lambs, 462 lbs., at 4 cents a pound, $18.48; one ewe reserved for stock, $3.08—total, $35.34, or $5.89 per head, the six sheep being at that time but two years old.

Income from the same six sheep for the year ending September, 1854, they being then three years old: 25½ lbs. wool, at 42 cents, $10.71; six lambs, 345 lbs., at 5¼ cents, $18.11; four ewes reserved for stock, estimating their weight as equivalent to that of the four best sold, $13.28—total, $42.10, less the value of the yearling fleece included above, shows the product of the six old sheep to be $40.57, or $6.76 per head.

Income from seven old sheep, (six of them four, and one two years old,) with four yearlings—eleven in all—for the year ending September, 1855: The seven old sheep produced fifteen lambs, four of which were lost during the extreme cold weather in which they were dropped. The remaining eleven lambs, weighing 576 lbs., were sold at 6 cents, amounting to $34.56; and of the whole clipping from the eleven sheep—39 lbs., 24 lbs. 13 oz. comprised the product of the seven old sheep, which was sold at 40 cents, amounting to $9.92, and making a total of $44.48, or a fraction over $6.35 per head.

Income of ten sheep for the year ending September, 1856, (one old ewe of the original stock having been slaughtered during the last autumn,) the ten including five five years old, one three years old, and four two years old: Whole number of lambs, sixteen—of which three were lost, two of them by being poisoned when their weight was 35 lbs.; received for the thirteen sold, $47.55; one buck lamb reserved for use, $5; 31 lbs. wool, sold at 42 cents, $13.02—total, $65.57, or $6.55 per head.

My sheep are South Down, and originated from the flock owned by Paoli Lathrop, of South Hadley. One ewe exhibited, five years old, has brought me nine good lambs, one of which was lost, but the remaining eight netted the sum of $55.

South Wilbraham, October, 1856.

Statement of Horace Clark.

The flock of sheep exhibited by me, ten in number, was appraised at $50, or $5 per head, April 1, 1856, and I submit the following statement of their product for the present year:—

52 lbs. wool, sold at 40 cents,	$20 80	
12 lambs, sold at $3 per head,	36 00	
		$56 80
Cost of keeping one year, $1.50 per head,	$15 00	
Washing and shearing, 8 cents per head,	80	
		15 80
Net profit,		$41 00

As these sheep are young, they will probably be worth as much in April, 1857, as they were in April last, for which reason I have made no deduction in their estimated value, in the foregoing statement.

WILBRAHAM, October, 1856.

Statement of J. L. S. Wesson.

The flock of sheep which I offer for premium consists of ten, and their product for the current year is as follows:—

35 lbs. of wool at 40 cents,	$14 00	
11 lambs sold,	38 93	
1 lamb reserved,	2 00	
		$54 93
Expenses for keeping, &c.,		15 00
Net profit,		$39 93

WILBRAHAM, October, 1856.

Statement of C. L. Buell.

The flock of sheep which I offer for the society's premium, consists of nine ewes and one buck, the former of native stock, the latter a mixture of South Down and native. The buck is two years, and the ewes from four to eight years of age. About the first of January last, seven of these ewes dropped one lamb each: in April following, the remaining two dropped each a pair of twins; and about the first of July, the seven first named again dropped one lamb each—making eighteen lambs from the nine ewes within seven months. Eight of the lambs were sold in June, at $4 per head. Three of the twins being ewes, were reserved to increase the flock, and these, with the seven last dropped, are the ones now on exhibition. The ewes will drop lambs again about the first of January, 1857. The average weight of fleece of the entire flock, was 4½ lbs. The keeping of these sheep has been, plenty of good hay in winter, and ordinary pasturage in summer.

Ludlow, October, 1856.

Statement of Samuel Warner.

The product of the sheep offered by me for exhibition and premium, has been for the present year as follows:—

5 lambs sold at Brighton, ...	$22 50
9 " " at home, ...	27 00
3½ pounds wool per head, at 40 cents, . . .	19 60
	$69 10

FRANKLIN.

Report of the Committee.

On Sheep.—The committee on sheep had supposed, previous to taking their tour of inspection, that the wool-growing interest of Franklin was this season turned over to the political current—and dark colored wool, at that. But on arriving at the show-grounds we found that the office of sheep inspectors, was,

in our case, no sinecure. In fact, there was the best display of sheep-fold that we recollect of ever having seen at any previous show. The following varieties were liberally represented:—

Spanish Merino; cross of French and Spanish do.; cross of French and Silesian do.; South Down; cross of Bakewell and South Down—a noble specimen of a wether from the fold of Orsamus Bardwell, of Shelburne. A very fine specimen of the Irish Smut—a buck 1 year old, very large—the property of J. R. Smith, of Sunderland; native ewes and wethers from the folds of Messrs. Childs, of Deerfield, and Ewers and Larabee, of Greenfield. Two South Down bucks, belonging to Thomas J. Field, of Northfield, were shown; not however, for competition, as Mr. Field had but recently purchased them in Berkshire, and they had never yet bitten the green carpet of the Connecticut Valley. They were perfect models of comely sheep, and attracted general attention. Mr. Field informed us that they were of 'Thorn's flock'—the importer. We congratulate Mr. F. on this valuable acquisition to his fold, and return thanks for his gratuitous exhibition of the animals.

Mr. B. of Leyden, who took the premiums offered for Merino and cross Merino bucks, is entitled to much praise for his endeavors to add to the show of sheep; but it was very evident that his breed of sheep suffered in a comparison with that of most other kinds exhibited: the South Downs, the cross of South Downs, and natives, even. But, according to the programme of the society, premiums were offered for the best specimens of animals, such as he exhibited, and he was accordingly favored. But your committee, in justice to Mr. B., and in justice to all other shepherds of our association, do not feel at liberty to recommend the cultivation of the French and Spanish, or French and Silesian crossed varieties of sheep. John Randolph, in one of his unique debates, once said, that he would go a mile at any time, out of his direct way, to kick a sheep. Your committee think that John must only have been acquainted with the French and Silesian cross.

Your committee unanimously recommend to the farmers of Franklin, the raising of full blood Spanish merinos, for wool; and for the shambles, the South Down, crossed with the native.

JOSIAH D. CANNING, *Chairman.*

SWINE.

MIDDLESEX SOUTH.

From the Report of the Committee.

The committee appointed to examine and award premiums on swine, at the exhibition of the Middlesex South Agricultural Society, held on the 17th and 18th days of September, 1856, have attended to that duty, and hereby ask leave to report.

There is scarcely a place in domestic economy, commerce, or the arts, in which some part of the swine is not indispensable; and no portion, not even the short hair, is thrown away. The exportation of pork, bacon, hams and lard to all parts of the world, is very large; for notwithstanding the Jewish law, swine's flesh is the principal food of a great portion of the human race. The consumption of lard alone, in the form of candles, oils, soaps, is extensive. To the apothecary it is "parmaceti for an inward bruise," and doubtless enters into many a healing and rejuvenating compound which would astonish the poor animal could he be made to understand his destiny,—could he but know as he lies down in "indolent vacuity of thought," and "accumulates much grease, eating corn," that he shall yet be bottled for "cod liver oil," or "bear's grease," or spread out perhaps into the unctuous "poor man's plaster," or the all-curing "Russia salve," to help feeble man the better "to grunt and sweat under a weary life;"—could he realize that his native manners and habits are imitated by less useful beings, and that even sausages are made, involving his very reputation, it is impossible to say whether any common yoke could confine him to his pen. But, after all, he is a very sensible beast, fulfils his duties, and submits to his fate; and, unlike man, "the good that swine do lives after them," and their bones are made into buttons.

From the best information we can obtain, the whole number of swine in the United States cannot be less than 40,000,000, which, if valued at $7 per head, would amount to $280,000,000, almost double the value of the cotton crop that forms so great an item in the commerce of the world. If, therefore, the aggregate value of the swine forms so important an item of our national

resources, and supplies so many indispensable uses, how necessary it is that all means be employed to improve the breed; and every farmer and housekeeper who has the general good at heart, should not forget that an improvement which would raise the average value $1 per head, would add $40,000,000 to the national wealth.

The introduction of the Suffolk, Mackay, and other favorite breeds, has done much to keep the attention of the public alive to the subject, and the interest manifested in the exhibition to-day, assures us that the success already obtained, are but leading the way to more valuable results.

We would not be understood as recommending a neglect of our own best native breeds; they should not be rejected for any fancy or foreign sorts, without careful consideration, founded on actual experiments and experience.

All which is respectfully submitted.

James W. Clark, *Chairman.*

Framingham, September, 1856.

WORCESTER.

From the Report of the Committee.

Mr. President and Gentlemen,—With instinctive modesty I appear before you as chairman of the committee on swine, deeply feeling as I do the responsibilities of the position I have unwittingly, and I fear, unwisely assumed; but, gentlemen, relying upon your well known courtesy, I have endeavored faithfully and to the best of my ability to discharge the task which you have assigned me.

It is placing one in a very awkward predicament, to be invited out to a dinner or evening party, and when the ices or jellies have disappeared, to receive a quiet intimation from host or hostess, that the time has arrived when he is expected to be exceedingly funny. Such a hint, however, deliberately administered, would chill the heart of the merriest, and banish every thought of jest or humor, unless, like the farmer's farrow cow, the luckless individual possesses the faculty of never drying up,

but is ever prepared to give down fun, frolic and comical stories the whole year round.

The traditions of the past, the hallowed usages of days gone by, all point to the report of the pig committee, as the peculiar and proper vehicle for fun in the celebration of our society. Prosy we dare not be, merry we would be; but the tricksy spirit who inspires with wit and humor, is coy indeed, and comes not always at bidding, though wooed never so earnestly. Wit, fun and frolic are like dew-drops that sparkle and glitter in the bright sunlight but for a moment; sprite-like they come and go, whence or whither, no one knows. After an earnest invocation to the deity of fun, that she will grant me a few ideas which may interest or amuse you, I proceed with the subject.

Historically, socially and gastronomically, the pig demands our careful attention. His connection with commerce, with the cuisine, and even with the great interest of fire insurance, have all made made him an object of particular regard. In the early days of the Celestial Empire, as we learn from the veracious writings of the witty and voracious essayist, Charles Lamb,—a wealthy Chinaman was so unfortunate as to have his dwelling destroyed by fire. Prowling around the smoking ruins, and seeking to save some of his valuables which the conflagration might have spared, his hand came in contact with the smoking remains of a poor pig which had perished in the flames; instantly, smarting with pain, he carried his hands to his mouth, when a peculiar flavor greeted his palate, such as the gods (Chinese ones I mean, of course,) might in vain have sighed for; regardless of pain, he applied himself once more, and drew forth from the smoking cinders the remains of the pig; carefully brushing off the ashes, he regales himself with the feast before him, but closely preserved the secret he had learned. In a few short months, however, the taste for roast pig came back so strong, that John Chinaman's house burned down again, and again was a pig found in the ashes. This was repeated so often, that the neighbors grew suspicious, and watched until they ascertained that the reason for the conflagration was the feast that invariably followed. Once out, the secret spread like wild-fire; every hill-top shone with the flames of a burning habitation, every valley was blackened with the ashes of a homestead, but roast pig was dearer to the Chinaman than home or honor, and still

the work of destruction went on. Alarmed at a course which bid fair to ruin every insurance office in the empire, the directors petitioned in a body to the general court of China for the passage of an act which should arrest the evil and avert their threatened ruin, and a careful examination of the revised statutes of China would probably show stringent prohibitions against the crime of burning houses for the sake of roasting pigs.

Since the invention of the modern cook stove, however, although incendiarism has decreased, only in a slight degree, still it has ceased to be attributable to this cause, and a juicy crackling is no longer suggestive of fallen rafters or a houseless family.

There is an old adage, "give a dog a bad name and his ruin is accomplished." Such may be true of the canine race, but the noble family of animals of which I am treating, furnishes a striking illustration that the proverb applies not to their numbers.

A goose, it is said, saved lordly Rome by his cackling, and had not their list of divinities just then been full, a grateful people would have found for him, a sedgy pond and quiet nest, in Olympus. How did the ancestors of that same people repay the pig for a service scarcely less important?

The veriest smatterer in the classics, knows, that, when from flaming Troy, Æneas, the great Anchises bore, seeking in strange lands a new home for his conquered people, a white sow, attended by thirty white little pigs, pure as herself, pointed out to him the seat of his future empire. But what did he and his people do for the pig in turn? Did they load him with honors? Did they cherish him with corn? Did they treat him with respect? No! with black ingratitude which still merits the indignation of every admirer of the pig, they affixed to the animal, the apellation of "porcus," and poor cuss the pig would have been to the present day, had not the Latin tongue long since ceased to be the language of the world. But poor cuss, he is no longer. When in Worcester county he spurns his classic name, and adopting the vernacular,—grows the whole hog—that he may pork us in return for the care which we bestow upon him.

For the sake of our farmers who are anxious to make a profit from pig raising, it is greatly to be regretted, that the thirty at a litter breed, already alluded to, has disappeared from the face of the earth. Breeding swine, with such a rate of increase must

be almost as profitable as shaving notes at two per cent. a month, but still the impression is irresistably forced upon us that in a family so numerous, those who came last to dinner, at least in their infant days, would not have gained flesh very rapidly. Indeed in such a family it would seem almost impossible to dispense with the services of a wet nurse, in order to bring up profitably the rising generation.

The course of the pig, like that of the star of empire, has ever tended westward. From China we trace him to Italy, the gloomy mountains of the Hartz, the broad plains of Westphalia, the fertile valleys of France, and to the waving forests of "merrie England;" all have known him since the days when their bold barons and hungry retainers sat down to feast on the juicy chine of the wild boar, and the savory haunch of venison.

In green Erin, piggy has been an important member of society; true he has shared his master's meal and basked in the comfortable warmth of his cabin, but, like a "gintlemon" as he is, he has ever paid the "rint," and Saint Patrick in the plenitude of his power and influence never saw the day he could have banished him from that gem of the ocean.

When the pig first crossed to this western world remains in doubt. Whether he came with the pilgrims, pressing with the foot of a pioneer the blarney stone of New England, and scanning with fearless eye the cheerless prospect before him, or whether, regardless of liberty of conscience, and careful only of his own comfort, he waited till the first toils and trials of a new settlement had been met and overcome, we have no record; enough for us that he is here; how, or when he came, concerns us not. He is among us and of us. From souse to sausage, we have loved him; from ham to harslet, we have honored him; from chine to chops, we have cherished him. The care we have shown him has been repaid an hundred fold. He has loaded our tables and lighted our firesides, and smiling plenty has followed in his footsteps, where hungry famine would have stalked in his absence.

But still farther toward the setting sun has been the arena of the pig's greatest triumphs; there have been the fields of his widest influence. Beneath the vast forests of Ohio, raining to the ground their yearly harvests of mast, through her broad cornfields, stretching as far the eye can see—he has roamed and

fed, and fattened. From him and the commercial interests he has mainly contributed to establish, has grown a mighty State, scarcely second to any in this confederacy; from his ashes has arisen a new order in society—the Bristleocracy of the Great West.

A broad levee bustling with business, lofty and spacious stores and slaughter houses, crowded pens, and a river bearing on its bosom steamboats in fleets, all attest the influence which the pig has exerted on the agricultural and commercial interests of the great state of Ohio. He has filled the coffers of her bankers, and has bought the silks which cover her belles; he has built the beautiful palaces which adorn the queen city of the west, and feeds the princely luxury of those who inhabit them. There he is almost an object of worship, and his possession is considered as about equivalent to a patent of nobility. Fancy dimly paints the picture, when a few years hence, the wealthy pork merchant, who justly boasts his numerous quarterings, shall, in the true spirit of heraldry, paint on the panel of his carriage, and the escutcheon over his doorway, a lustrous shield bearing in brilliant colors a single pig—his bristles all rampant, his tail closely curlant, and his mouth widely opant, till the lions, the griffins, and the unicorns of the old world shall fade into insignificance before the heraldic devices of the new.

George S. Taft, *Chairman.*

WORCESTER WEST.

From the Report of the Committee.

Your committee having attended to the duty assigned them, would say, in the outset, that they regard the duty of awarding premiums as important, and requiring the closest and most candid attention.

Immediately after the creation of man, God gave him a right to make use of the animals that were below him in the scale of organization, to enhance his comfort, pleasure, and gratification; and also for sustenance and the purpose of labor. Man thus became lord of the animal creation; he accordingly uses one animal to warm him, another to furnish sustenance, and still

another for purposes of pleasure. Among the different species and varieties of animals, not the least honored, or useful, is the hog, belonging by classification to that group of animals called, Pachydermata. His physical attributes have from time to time been gradually developing, until he has become the most important of the domestic animals, and a favorite of the most enlightened nations of the earth. Indeed so respected is he, that a farmer's hoggery is considered a very strong indication of his public spirit and generosity, or of his selfishness and inhumanity. His piggery is visited by the young and old, by statesmen, politicians, lawyers, merchants, mechanics, artisans, and sometimes by the divine. These all occasionally lean over the enclosures of the pen, gazing in wonder and admiration at the comely form and silvery brightness of the hog.

But if honored when living, he is none the less so, or useful, when dead, for

"The good the hog does lives after him."

His thighs and sides make pork and bacon; his feet, head and ears, pickled, constitute the nutritious article, termed souse; his entrails furnish envelops for the sausage; his bristles are manufactured into brushes, and to them the cordwainer is irredeemably indebted; from the shavings which come from the manufactory of brushes and from the finer bristles, mattresses and cushions are stuffed; so that, while the meat of the swine affords nourishment to the exhausted system, his covering is a bed on which the weary may repose for rest; from his leaf fat and mesentery, lard is extracted, which gives to doughnuts their exquisite flavor, and enters largely into the composition of pies, and many other domestic uses. From the lard, oil is made, and from the refuse matter, left after the manufacture of oil, stearin candles are made. But this is not all,—from the blood of swine prussiate of potash is manufactured by the ton. Thus is it emphatically true, that the good the hog does lives after him.

The hog is adapted to every variety of climate, and in this respect is a perfect cosmopolite, a citizen at large, coming to maturity early, and being easily improved by the breeder, is more quickly rendered suitable for the purposes required than any other description of live stock. From no other source can the poor man so readily and cheaply supply his table with nutri-

tious food, and no branch of farm husbandry pays so well for the required care and attention as the raising and fattening of swine for the market.

Much has been written and said in regard to different breeds; while some prefer the Suffolk, others are as much in favor of some other breed, or the crossing of different breeds. In discharging the duty assigned them, your committee are fully aware of the prejudice in many minds in favor of different breeds of swine; yet, conceding to every breed its just merit, and to every man's opinion all that is due, we claim for ourselves like preferences. It is a fair and an important inquiry to make: What, and how many really distinct breeds of hogs are there? Some are so, clearly; but the question is much more easily asked than answered. That there is a difference, your committee do not doubt, but the question in point is, whether there is not more stress laid upon the breed, than upon the manner of feeding and taking care of them, providing them with suitable places for eating, sleeping, &c.; also, accommodations for manufacturing manures. This is an important source of profit.

It seems clear, that the Suffolks being small and easy to fat, are a suitable breed to cross with. The only difficulty is to know and obtain the best breed for crossing with them; to put a case within the reach of all, almost any of the large, "old fashioned kind," would make a good crossing with the Suffolk.

J. Warren Bigelow, *Chairman.*

POULTRY.

ESSEX.

From the Report of the Committee.

The committee regret that the entries were not so numerous as in years past; mainly, as they suppose, to be attributed to the reaction which has followed the excitement of former years.

In the opinion of your committee, the subject is one of great

importance to the American farmer, and if exact statistics of the value of poultry raised in the United States could be procured, all would be astonished. In Massachusetts alone, the annual value of poultry and eggs is several hundred thousand dollars. Poultry is raised at a very little outlay. Two-thirds of the year their food is gleaned from the fields; during the winter, it is true, they have to be fed, but usually before that sets in, the greater portion of their number have met a violent death.

Your committee would strongly urge the farmers' wives of Essex county, to raise poultry; it is a profitable and pleasant pursuit, attended with little expense and considerable income.

ROBERT BROOKHOUSE, JR., *Chairman.*

HAMPSHIRE, FRANKLIN AND HAMPDEN.

From the Report of the Committee.

Previous committees have enumerated the advantages of keeping poultry. The profit derived has been shown to amply repay the slight inconvenience and expense of raising. It has been demonstrated by frequent experiments that domestic fowls, when skilfully cared for, are no small source of gain to the farmer. The high prices of poultry and eggs, show that the supply is fast falling short of the demand, and that a much greater number might be raised with advantage.

The farmer should endeavor to combine the ornamental with the useful, and we know of no better way by which he may beautify his farm-yard, than by stocking it with selections of the best varieties of poultry, such as the Bolton Greys, Golden Pheasants and Black Spanish, which have the advantage of being both good layers and "good looking." Poultry, by long custom, have become an essential part of a New England farm, and have thus an established right to its hospitality. A good rooster is cheaper than an alarm clock; for he needs no winding up; and rain or shine he will crow in the morning.

Speaking of crowing, your committee can do nothing of the kind over this exhibition. When they consider what a fine dis-

play the county is capable of making, this appears but a meagre affair. There were some exhibiters who did much to render the show what it should have been. Among them, was O. D. Hastings, whose Bolton Greys were the finest we have ever seen.

The greatest variety of fowls was exhibited by Dr. Benj. Barrett, who thoroughly understands the raising of poultry, and we hope that next year there will be many to follow his example. The coop of Mr. Tribus was decidedly *multum in parvo*, there being about twenty hens in a box none too large for a canary bird. It reminded us of the "Bee Hive."

Wm. E. Turner, *Chairman.*

PRODUCTS OF THE DAIRY.

ESSEX.

From the Report of the Committee.

The committee on dairy, in the absence of their chairman, whose place was temporarily supplied by the undersigned, having attended to their duties, respectfully report:—

That the specimens of dairy products, if not so numerous as could be desired, are more so than in many former years. Twenty-two samples of butter for premium, and three for exhibition were entered; and most of them were brought within the society's rules. Of cheese, four specimens were entered. The butter and cheese were tested by the committee.

As respects butter, it may be well to say, that some of the specimens, originally good, beyond all doubt, were essentially damaged by the quality of the salt, and a few specimens by the wood of the boxes containing them. A *new pine wood* box will spoil any butter. However strong the desire may be to bring forward a handsome exterior, the container should certainly be sacrificed to the good of the *contained.*

One word respecting salt for butter; and in doing this, we cannot do better than to repeat the remarks of the committee in 1844. "Liverpool bag salt," say they, "should be rejected; it contains impurities and will not preserve the butter. Rock salt, perfectly pulverized, and three-fourths of an ounce used to a pound of butter, will preserve it well."

The committee, in concluding their report, cannot withhold their approbation of the society's rule, by which the names of the applicants for premium are concealed until after the decisions have been made. There is no longer any suspicion of favoritism, and the poet's thought is applicable even here—

> "Honor and shame from no condition rise;
> Act well your part, there all the honor lies."

Under an offer of premium by the society last year, relating to milk, as a dairy product, the committee are happy to have received a statement from William R. Putnam, of Danvers. It is an interesting and important document, and will be found following the usual statements relating to butter and cheese. As Mr. Putnam has conducted his experiment so satisfactorily, and so perfectly within the rule prescribed by the society, although there is no competition, the committee awarded to him the first premium.

D. Choate, *Chairman.*

Statement of Sarah L. Ridgeway.

I present for your inspection, 16 pounds of September butter.

Process of making: The milk is strained into nicely scalded tin pans, and allowed to stand thirty-six hours in a well ventilated cellar, when it is skimmed into tin pails, and stirred morning and evening for two or three days, as most convenient; when it is churned and well washed with cold water, and salted to taste. After standing a sufficient length of time for the salt to dissolve, it is well worked, more salt added, if needed, as some will naturally work out, and then made into balls for the market without coloring or ornament. If the weather is quite warm I use the ladle to work it with, if not, the hands.

I have followed the above process for the last twenty years, and think as highly of it now as ever; some, I know, d isapprove the washing, which I consider very important, as I dislike the taste of the buttermilk more than brine, if any is allowed to remain in after it is worked. It is through the influence of customers that I am induced to offer this specimen for examination.

Statement of William Marshall.

I offer for inspection 50 lbs. of cheese, as a specimen of 1,050 lbs. made from the milk of eight cows, in seventy days, commencing with June 17th and ending August 25th.

Immediately after the evening milking, the milk is strained into a tub, and rennet is added in the proportion of half a teacupful to 12 gallons of milk. In about thirty minutes the curd is formed, when it is broken up, separated from the whey, and left to drain until morning. It is then sliced, the morning's milk is strained upon it, and the process of the evening repeated. After draining four hours it is ground, and salted with five ounces of salt to fifteen pounds of cheese. The cheese is pressed twenty-four hours, afterwards cased in cotton cloth, and removed to a dark room, where it is turned and rubbed daily.

Statement of William R. Putnam.

I offer for your consideration the following statement of my cows, which I enter for the premium offered for the greatest produce of milk.

On the 1st of January, 1856, my dairy consisted of nine cows; most of them are such as are usually called natives: in some of them are to be seen marks of the foreign breeds. Of their origin or pedigree I have no means of knowing; of their value I can state what I paid for each, as they have been purchased at different times:—

		CALVED.	SERVED TO CALF.
No. 1,	$46 00, . . .	July 2, 1855	Nov. 15, 1856
2,	45 00, . . .	Jan. 19, 1856	Apr. 10, 1857
3,	30 00, . . .	Dec. 13, 1855	Nov. 25, 1856
4,	16 00, . . .	May 10, 1855	
5.	23 00, . . .	Jan. 20, 1856	

		CALVED.	SERVED TO CALF.
No. 6,	$32 00, . . .	Apr. 10, 1856	April 8, 1857
7,	34 00, . . .	Mar. 3, 1856	Feb. 21, 1857
8,	30 00, . . .	Dec. 6, 1855	Nov. 15, 1856
9,	17 00, . . .	May 3, 1856	Apr. 20, 1857
	$273 00		

Average cost, $30.33.

No. 5 was sold to be fattened, May 10th, for $23.

No. 4 was sold for beef June 17th, for $44.76.

The cows were fed during the winter in the following manner:

A trough about eight feet long, three feet wide and eighteen inches deep, was filled with chopped straw, salt and meadow hay; this was wet with four pails of water, and one-half bushel of fine feed or shorts was well mixed with it; this was their morning meal; at noon they had one peck of carrots each, and a feed of whole hay. At four o'clock they had the same feed of chopped hay as in the morning. At eight o'clock in the evening they were fed with corn fodder. Twice in each day they were turned into the yard to drink; when the weather was mild they were kept out a few hours. They were milked about four o'clock in the morning, and at noon. During the winter they had but little good hay; after the middle of April until they went to pasture, they had good English hay.

Of the cost of feeding the cows during the winter I can give no accurate statement, as much of the fodder consumed was not merchantable. I bought two tons of shorts, at $30 per ton, and two tons of salt hay, at $11 per ton; the rest was grown upon the farm. During the months of June and July they had only what they could get in the pasture; in August they were fed at noon and at night with green corn stalks; in September they have been in fall feed, and have not been fed from the barn.

It is an object with me to save as much of the manure as possible; the cows are kept in the barn nights, all the year, and the cellar beneath is well supplied with muck to receive the droppings.

It will be seen by the above statement that but five of my cows have calved since the 1st of January; three of the calves were sold when a few days old for one dollar each; two were kept for veal, and sold for $8.50 each. No exchanges have been

made—a thing which I never did; I make it a rule, if I get a good cow to keep her: if I have a poor one, fit her for the butcher as soon as possible. The cow that was sold for beef in June, had in addition to what the others had, about eight quarts of Indian meal per day. I usually continue to milk my cows while I am fattening them. I give them about as much meal as they will eat; when they begin to shrink in their milk they soon grow fat, and then I can usually sell them for enough to buy a good new milch cow.

The produce of the cows for the last nine months, has been as follows, for milk sold the milk-man, who has taken it at the door:—

January,	1,267 quarts, at 4 cents per quart,		$50 68
February,	1,511 " " "		60 44
March,	1,838 " " "		73 52
April,	1,716 " at 3 cents per quart,		51 48
May,	1,715 " " "		51 45
June,	1,744 " " "		52 32
July,	1,485 " " "		44 55
August,	1,372 " " "		41 16
September,	1,279 " "		38 37
	$13,927		$463 97
Five calves, ...			20 00
In addition to what the milk-man has taken, we have sold 600 quarts to families, at 4 cts., .			24 00
And made 25 lbs. of butter at 24 cts., . .			6 00
			$513 97

I find that my stock has averaged but a fraction over eight cows for the nine months. This makes the income of each, $64.25.

I have made no mention of milk used in my family, which has probably been about two quarts per day. I find that when I add to the milk sold, that used for making butter and used in the family, that for 274 days in the nine months past, that my cows have averaged nearly seven quarts per day. Perhaps I ought to state that the measure used was wine measure.

In feeding roots to my cows I usually begin with the flat

turnip; I feed many of these with the tops, in October. I next use the carrots, keeping the ruta baga until spring, as I think it is better when it begins to soften a little. For making milk, I think that hay should be cut earlier than it should be when fed to other stock.

DANVERS, September 30, 1856.

WORCESTER.

From the Report of the Committee.

BUTTER.—The committee stand upon the platform of principles enunciated in their last annual report, without inserting any new planks therein. Butter, as one of the indispensable institutions of American society is not to be neglected or overlooked. Butter, as the connecting link between the present and the past, deserves our respect. Butter, as a discipline, is to a farmer boy at least a subject of remembrance. Good butter is as much a blessing as ever, while poor butter is still an unmitigated curse. Now the essentials to making good butter, the mode of doing it, and the various matters and things relating thereto, are they not written in the report of your committee for the year 1855?

A suggestion was made by the ladies upon the committee, that the present mode of proceeding in the matter of butter, does not produce the excellence in the article which is desirable. The remedy suggested, is, that premiums should be offered of sufficient amount to induce the competitors to keep their butter long enough to enable time to apply to it its unmistakable test, and thus determine beyond all doubt the question of excellence of the article.

The suggestion is made for the consideration of the society, with the fervent wish on the part of the committee, that some course, if possible, should be devised to relieve a suffering community from a bitter, rancid, disagreeable, disgusting, or indigestible compound, which is to all intents and purposes a nuisance of the vilest kind.

Pharaoh, with all his ingenuity, never invented for the

children of Israel a more intolerable infliction than he could have done, if he had imposed upon them the penalty of being obliged to eat poor butter.

HENRY CHAPIN, *Chairman.*

WORCESTER NORTH.

From the Report of the Committee.

BUTTER.—The art of making good butter comes down to us through the venerable lapse of ages, long since passed, bearing upon its brow alike the marks of time and of vernal freshness and purity.

So important has this product of our farms become, that she who successfully vies with her sister dairy-women in producing the purest, sweetest, and most palatable article, can command for it her own price, and stand forth as the undisputed sovereign of the product of her skill and industry, without a rival. Such a position of celebrity, however, is occupied but by the few, while the mass plod on in the old beaten track, with but little, seemingly, to care or hope for.

The demand for good butter, both at home and abroad, is rapidly increasing, and should stimulate our farmers, not only, to increase its supply, but so far as possible, improve its quality.

Most of the specimens contributed for the inspection of your committee, were of superior quality, and serve as significant evidences of what our fair dairy-women can do in this section of old Worcester county.

J. S. BROWN, *Chairman.*

WORCESTER WEST.

Statement of A. H. Fay.

BUTTER.—My manner of making butter is to set the milk in tin pans, about half full, raised from the shelf on two narrow sticks, and let it stand not over four meals. The cream should be taken from the milk while sweet, and stand not over three

days, and stir it every day until churned. After churning, work the butter-milk out as much as possible before salting. No washing is necessary to make the butter keep well, for it will keep better without. About one ounce of salt to a pound of butter is required to salt it. It should be worked over the second day after churning, and put down in stone jars and covered close from the air,—kept above in the winter and in a cool, dry cellar in the summer, and it will keep the year round.

Statement of Cameron Corbin.

The butter which I offer for premium, was made in the following manner: The milk is kept in the cellar, strained in tin pans, about half full. It stands twenty-four hours, when the cream is taken off and churned once in five days; it is then taken out and salted to the taste; it stands two days and is then made ready for market.

Statement of Israel Fisher.

The milk is strained into tin pans, about two-thirds full, letting it stand twelve hours in a cool place; the cream was taken off and put in a stone jar and stood four days and stirred every day, adding a little salt to it, and then was churned. After churning, draw off the buttermilk and wash it in one or two waters, for that will take out the buttermilk better than working it with the hands; then salt to the taste, let it stand twenty-four hours. Twice working over is sufficient.

MIDDLESEX SOUTH.

From the Report of the Committee.

Butter.—The committee on butter and cheese make the following report:—

There were fourteen lots of butter entered for the premiums, and of a very superior quality. The committee found much difficulty in ascertaining which was the best.

For the best produce of butter on any farm, from the 15th of May to the 15th of September, there was but one competitor,

Simon Plimpton, of Holliston, who exhibited a very good specimen of butter, and would have been entitled to a premium if he had complied with the requirements of the society. He gave the committee no information how he made this good butter; only the manner of keeping the cows and their produce, which is as follows:—

"The dairy I offer for your consideration, consists of three cows: one native, six years old, and two Devons, three years old. Ten days in June they made 38 lbs. of butter, and in ten days in September, 34 lbs. The amount of butter from May 20th to September 15th, was 390 lbs. During that time 50 lbs. of two-meal cheese were made. Their feed was only grass till the 15th of August: after that, grass and corn fodder."

Many things are requisite for the manufacturing of good butter. Every thing connected with dairy utensils should be kept as clean as possible. The room or the cellar in which the milk is kept, should be made as sweet as air, water and lime can make it. No good butter can be made from cream standing in foul cellars or rooms. The best butter is made from cream which is taken off the milk at the end of twenty-four hours. Allow the same milk to stand twenty-four hours longer, the milk skimmed and the cream churned, and it will produce very poor butter,—tasteless, and about the color of cheese-curd. (The above remarks apply to the warm season of the year.) The proportion of butter made from the two skimmings of the milk, will be the first, two-thirds, the second, one-third; and by putting the two together, you would increase the quantity but diminish the quality. Butter commanding twenty-five cents per pound, by the union of the two, would readily bring thirty seven cents per pound by leaving off the latter. Probably one of the greatest causes why there is so much poor butter brought into the market, is, the cream is suffered to stand too long upon the milk before it is skimmed; and it would not be too bold to assert, that one-half of the butter that is made in the warm season of the year, is made from the cream taken from sour milk. When the good dairy-woman discovers little bunches or blotches arising on her cream, the sooner the cream is removed from the milk, the better. Another very important thing is the temperature of the cream when you commence churning. In the warm season of the year, it should be fifty-six degrees; in the

cold season, sixty-two. It is almost impossible, when the butter comes soft, to make good butter of it. The butter-milk should be thoroughly worked out, and the sooner after churning the better, for if suffered to remain in the butter it will soon become rancid. The best machine that has ever yet been invented, is woman's hand, although there are cold hands and warm hands; but the committee would not insinuate that the hand is always a proper index of the heart.

But to sum up the whole, good butter making consists: First, cows that will give milk that will make yellow cream. Second, good pastures, and the cows well cared for. Third, every thing to be made sweet and clean connected with the dairy. Fourth, the milk to be skimmed and the cream to be churned at a proper time, right temperature, and well seasoned.

PETER FAY, *Chairman.*

HAMPSHIRE.

From the Report of the Committee.

CHEESE.—There were fourteen entries of cheese. The specimens were all of fine quality. In the methods of making there was but little variety among the successful competitors.

No. 1. According to the statement, the milk is strained into a kettle and rennet is added, after which it stands until the curd separates from the whey. It is then dipped off and permitted to drain, until dry enough to make into cheese. The same process is repeated with next day's milk, when both curds are put together, warmed, salted, pressed two days, and turned daily till cured.

No. 2. The night's milk stands in a kettle till morning, when it is warmed and rennet is added sufficient to bring the cheese in about an hour, when it is drained, pressed two days and turned daily till cured.

No. 3. The cream is taken from the night's milk, and warmed with morning's milk; then rennet is added sufficient to bring the curd in an hour; then it is scalded and drained till afternoon, when it is put into the press.

No. 4. Rennet is put into the milk when strained. The milk

stands till the curd is separated, which is then drained, warmed, salted, pressed two days, and turned daily till cured.

No. 3 was made from a dairy of ten cows; No. 4 from a dairy of eight. A large dairy appears to be an important condition of cheese. Its quality must be affected, also, by the character of the cows and of their keeping. "There seems at first sight, to be no connection between the application of bones to the Cheshire farmer's poor grass land and the unexpected crumbling of the Cheshire dairy-maid's cheese. Yet the connection is plain enough. The bones bring up richer grass, which gives richer milk; and this treated in the old way makes a fatter and therefore more crumbly cheese."

In the manufacture there should be a regard to health as well as taste. Milk is the first and natural food of man. It would appear, therefore, that cheese eaten as food, to be most healthful, must partake, as nearly as may be, of the ingredients of milk in natural proportion. If cream is added to the milk, it makes a cheese too rich for common use as food, and if taken from it, too poor. Of all indigestible articles of diet, scarcely any can be more so than hard, skim-milk cheese. It is a wonder how that called the Suffolk, (Eng.,) whose milk is skimmed three or four days in succession, can be digested in human stomachs, for it often requires an axe to cut it, and is said to be so hard that "pigs grunt at it, dogs bark at it, but neither of them dare bite it."

Mr. Johnson, an English writer on agriculture and chemistry, has given a table, comparing the ingredients of milk, cheese, (new and skim-milk,) beef and eggs, as follows:—

	Milk.	New.	Skim.	Beef.	Eggs.
Casein, (curd,)	35	45	80	*89	55
Fat, (butter,)	24	48	11	7	40
Sugar,	37				
Mineral matter,	4	7	9	4	5
	100	100	100	100	100

"We see from this table that both cheeses are free from sugar. Either of them, therefore, must be eaten with a quantity of veg-

* The curd of milk, muscle of meat and white of eggs are nearly identical.

etable food, which may supply the starch or sugar required to make it equal to milk, as a general nourishment. Again, the new milk cheese contains more fat than even the eggs. It is too rich, therefore, to be used as an every day diet by the generality of stomachs. It is partly for this, and partly for the previous reason, that cheese and bread are almost invariably eaten together.

"Then, in the skim-milk cheese, we have only eleven per cent. of fat mixed with eighty per cent. of the very constipating curd. Experience has shown this to be far too little, and therefore butter or fat bacon, as well as bread, must be consumed along with these poorer cheeses, when much of them is intended to be eaten; or they must be cooked in made dishes, along with some other variety of fat."

The conclusion of the whole matter is, that, as unskimmed milk is the most healthful to drink, so is unskimmed milk cheese most healthful to eat: and that which is most agreeable to a healthy palate may generally be presumed to be most healthful to the animal system.

W. H. Beaman, *Chairman.*

PLYMOUTH.

Statement of Mrs. Willard Wood.

Butter and Cheese.—The butter which I present for your inspection was made in the following manner, which is my usual method of making it. I set my milk in tin pans, let it stand from 24 to 36 hours before skimming, according to the weather. My cream is churned soon after it is taken from the milk, when it is sweet. The butter, when taken from the churn, is rinsed in cold water, then salted with fine rock salt, about one ounce to the pound; it is then put in a cool place until the next day; then worked over and made into balls, and packed in a stone pot, covered closely.

My method for making cheese is as follows: I strain my night's milk into a tin kettle; next morning warm it as warm as it was when first milked from the cow. Then put in my morning's milk, and a sufficient quantity of rennet to curdle it in a

short time. After separating the curd from the whey, I hang it in a cool place until the next day. I then slice it, and put some warm sweet whey to it, and let it remain until I have scalded my second curd. I then put them together and drain it until it is quite cool before I chop and salt it. I use ground rock salt.

FRUITS AND FLOWERS.

ESSEX.

Report of the Committee on New Fruits.

The report of your committee on the introduction of new fruits, is necessarily meagre. Although a large sum of money is annually at their disposal, for seedling grapes and other new fruits of specific qualities, of the former, none have been presented, deemed worthy of the premiums; and of the latter no competitors have appeared.

The citizens of Essex county are, however, aware of the society's liberality, which doubtless has, ere this, operated as an inducement for some to attempt the raising of new hybrids, and the improvement of native fruits by cultivation and successive seed-sowing. Years must necessarily elapse before the objects can meet the conditions. Hence, it is presumed that subsequent committees on new fruits will have more extended duties, and interesting statements to accompany their reports.

Two gentlemen presented seventeen specimens of seedling grapes, on the first day of the exhibition, which were examined by the committee.

The seedling grapes of James Blood, of Newburyport, were of the number. Mr. Blood offered grapes from the same vines for the consideration of the committee of 1854. That committee were unanimous in their opinion, and the chairman made an elaborate report specially on the merits of Mr. B.'s grapes. As several of your committee were members also in 1854, and being of the "same opinion still," they would only add that these seedlings have not deteriorated in either appearance or

quality, notwithstanding the unfavorable season for the ripening of grapes.

E. S. Rogers, of Salem, presented samples of fifteen hybrid seedling grapes, produced by crossing the Black Hamburg and Sweetwater with a large native grape called the "Mammoth." The committee compared these with the Isabella, Diana and Concord varieties, and regret to say, that they did not find any equal to the Isabella or Diana. They observed a marked difference in the numbers, and made a record for future reference. Mr. R. writes, that "the two best varieties are gone, having had only a bunch or two—that his vines are hardy—that he has in all forty-five now growing, most of which will probably fruit another year." Among so many we shall hope for a good wine grape adapted to our northern climate.

The committee should be informed of the time of ripening, on or before the fifteenth of September. Mr. Rogers will, doubtless, another year, meet all the requirements of the society for premium, which he is probably aware cannot be awarded, if deserved, until the fruit is tested by the committee two years. He has commenced in the right way, and such efforts will in time be rewarded, more substantially than by even our highest prize or praise. Experiments, whether novel or common, begun, watched and perfected under one's own direction, have their gratifying reward, as they progress, and in the end may prove a lasting honor to the author, and a boon to posterity.

How recently were the native strawberries, raspberries and blackberries from the fields and wilds, the chief source of supply to our cities. The remarkable improvement by hybridizing these, especially the former, should stimulate and encourage to equal perfection in the cultivation of other small though not less indispensable fruits, such as the cranberry, thimbleberry, whortleberry, &c., even at the risk of injustice to certain industrious dames, who may be led to exclaim with Othello, that their "occupation's gone!"

It is well known that many of our most valuable apples and pears, natives of this country, are chance seedlings. What inducements have we, then, to further perfect these invaluable fruits, in their congenial soil, by science and skill so successfully employed in other countries, under less favorable circumstances.

E. G. Kelley, *Chairman.*

Report of the Committee on the Cultivation of Pears.

There is probably no fruit tree varying more in its culture upon different soils and in its growth, than the pear. Each variety we may say has a peculiarity of its own, hence the Bartlett will assimilate to itself materials for an abundant crop in almost all good soils, while the Beurre d'Aremberg, Diel, Wilkinson and Lewis, require a strong and deep soil to produce well-developed fruit. It is hardly possible for any one individual to decide upon this desideratum in the culture of this fruit; hence the necessity of an interchange of opinions among the most experienced of our cultivators, to arrive at a knowledge of these important facts.

I have said that each variety has a peculiar character, either in its growth, or the production of its fruit. There are some varieties which bear the largest and best fruit upon young trees; for example, the Flemish Beauty; while the Glout Morceau requires years of bearing before it will develop fine fruit. There are others which bear the best fruit when worked upon our largest standards; others are more productive and finer upon the quince root—such as the Duchess d'Angouleme and Louis Bon d'Jersey.

A want of knowledge of these peculiarities, accounts for the various and conflicting statements made at the pomological conventions. This peculiarity of soil was strongly exemplified at one of these meetings, wherein two cultivators living within twenty miles of each other, both of their gardens being exposed to the sea with similar aspects, were diametrically opposite in their opinions of the Napoleon pear, one testifying that with him it was very poor in quality and a shy bearer; the other, that its peculiar quality was never surpassed, and that it was an abundant bearer. From our own experience of this variety, we have found it poor and astringent in a warm, sandy loam, while upon a strong and retentive clayey one it has been very fine. We have also found that the Belle Lucrative as a fall pear, and the Bloodgood as a summer fruit, when grown in a warm and loamy soil, to be first rate.

There are but few varieties which are equally good in all soils proper for the pear; the diversity of soil and culture necessary for some varieties, must influence cultivators in forming a list;

and this diversity of soil and culture should be given to enable them to make a selection for their locality. "I have known," says one, "fruits which were very fair immediately around the spot where they originated, almost worthless when planted but a few miles away in other exposures." Now this word "exposure," as well as "acclimation," are terms grossly misapplied, and have little to do with facts. The want of a congenial soil, and not "exposure," is a better explanation. We herewith give a list of pears which we think may be safely recommended for trial at least in our county:—

Early Pears—	Bloodgood, pear stock,	Warm sandy loam.
	Rostiezer, pear stock,	Strong clay loam.
Sumr. Pears—	Bartlett, pear stock,	Any good pear soil.
	Andrews, pear stock,	Warm sandy loam.
	Golden Beurre, pear stock,	Warm sandy loam.
Early Fall —	Belle Lucrative, pear stock,	Warm sandy loam.
	Cushing, pear stock,	Warm sandy loam.
	Dix, pear stock,	Strong retentive do.
	Gansell's Bergamotte, pear stock,	Strong retentive do.
	Thompson, pear stock,	Warm sandy loam.
	Buffum, pear stock,	Any good pear soil.
Late Fall P'rs—	Seckel,* pear stock,	Any good pear soil.
	Wilkinson, pear stock,	Strong loam.
	Beurre Clairgeau, pear or quince stock,	Strong loam.
	Louise Bon d'Jersey, quince stock,	Strong loam.
	Duchess d'Angouleme, quince stock,	Strong loam.
Early Winter—	Lawrence,† pear stock,	Strong loam.
	Lewis, pear stock,	Strong loam.
	Winter Nellis,† pear stock,	Any good pear soil.
	Glout Morceau, pear stock,	Strong loam.
Cook. Pears—	Vicar of Winkfield, pear or quince stock,	Strong loam.
	Black Pear of Worcester, pear stock,	Strong loam.
	Catillac, pear stock,	Strong loam.

JOHN M. IVES, *Chairman.*

* Should be worked upon large trees. † Should be worked upon large stocks.

From the Report of the Committee on Flowers.

As this is the first time "our society" has placed woman on its committees, it may not be amiss to preface the report on flowers with a statement of the fact, written by one of the ladies:—

At the first Cattle Show of which we read,
MAN, sole committee, over all presided
Till the Great Husbandman, who saw the need
Of WOMAN'S gentler counsel, thus decided:
"It is not good for man to be alone;"
And straight a help-meet formed to share his throne.

In this display, where Nature, fresh and fair,
To Eden's bowers tempts back the roving will,
The olden precedent is brought to bear,
And Eve's quick tact is blent with Adam's skill,
To trace the hand of God in fruits and flowers,
And scan the product of man's feebler powers.

If, in the judgment thus conjointly rendered,
Error, like evil, craftily creeps in,
That same old plea, which father Adam tendered,
Can now be urged to palliate the sin,
And every blunder written, thought or said,
Be visited on luckless woman's head.

The committee to whom was assigned the floral department of the exhibition, respectfully report that the display of flowers was very good, far exceeding their expectations in beauty and variety. A rich display of dahlias from H. K. Oliver, of Lawrence, also fine varieties of the same from Timothy Ropes, of Salem. There were also many beautiful floral designs, bouquets and flowers from Andover, Haverhill, Amesbury, Salisbury, Ipswich, Newburyport, and other towns. Your committee regret that some of these were destitute of labels at the time of examination, thereby precluding them from being noticed as they merited, and it is hoped a similar occurrence may be avoided in future exhibitions. Your committee have bright hopes of further efforts and more general contributions to future exhibitions.

Having no funds to give as premiums, the small amount allowed for gratuities was apportioned to the several contributors.

What earthly employment is better calculated to gratify and give zest to exertion than floral culture, so cheap and easy in pursuit, and so healthful and beautiful in its results? What attraction would it give to the country to see the farm residences decorated with nature's beautiful flowers, where now may be mere waste and desolation! How beautifully would this arrangement harmonize with the peace and industry found within doors, nor would it in any perceptible degree infringe on other duties. With little attention and expense our town residences may be ornamented with nature's beauties, and every home, by the most natural associations, be made genial and happy. Nature, ever bountiful, is ready to assist in carrying out any improvements that may be suggested. Your Committee have only to repeat and confirm the suggestions made in reports for the last few years, to those who may be in need of information, to procure their plants and seeds from those known to have the best varieties. Who that reflects on the many evils consequent on man's misemployment, does not at times almost blush to be a man; but then again, who, viewing the high attainments to which he may aspire, would be an oyster? Cultivate, then, a tree or raise a flower.

WILLIAM ASHLEY, *Chairman.*

HAMPSHIRE, FRANKLIN AND HAMPDEN.

Report of the Committee on Fruits.

Your committee were much gratified with the exhibition of the various fruits presented for public examination, more particularly with the fine display of apples. As one views such an exhibition, he wonders why these fruits are not far more extensively cultivated in our community. Where few individuals are able to present many varieties of the choicest fruits, why may not, and why should not, the number be increased ten, or even a hundred fold? For instance, why should so many of our farmers remain contented with the growth on their farms, of so poor apples, when, with a little industry, pains-taking, and patience, they can raise apples of a superior size, and of the

finest flavor? This they should do, if they desire to promote, what most aim at in life, their own pecuniary interests. Such are now the facilities for railroad, steamboat and ship communication with every part of the world, that apples, grown in this valley, may be speedily and easily sent to the most distant portions of our land, and even to others, with very great profit to all engaged in the business. Apples raised in this vicinity would as soon bring nine dollars a barrel in the London market, as those have done that were raised on the banks of the Hudson or the Genesee. And if a single apple of the quality and size of hundreds on exhibition here would bring a dollar at retail in California, as the committee are assured has been the case, why is it not one of the most profitable enterprises of the day to engage in the culture of the apple, especially, in view of the contemplated and probable railroad to the Pacific? In such an event, our apples might not only be carried to the Pacific shore by rail, but by steam navigation to the islands of the Pacific, and even to the shores of Asia. Apples of the first quality will find, somewhere, almost every year, a remunerative market, since it is a fruit so healthful, so universally acceptable and desirable. In the cultivation of this fruit, as in other ways, we are to labor for those who come after us. We are to plant trees whose fruit we may not expect to gather. We are to act in the spirit of the aged man who was employed with the writer of this report, some years since, in setting out apple trees; and as the writer said to him, we know not who will gather the fruit of these trees, when he replied, "it is no matter." Suffice it to say, that the whole subject of preparing the grounds for apple orchards, of transplanting, pruning and nurturing the trees, demands far more attention than it has hitherto received in this community. Requisite care, it is said, will cause the trees to bear every year. And let it be remembered we live in a climate, and possess a soil, most favorable to the growth of the best varieties of the apple on the tables at the society's exhibition; and if a still finer display, in years to come, of this most excellent fruit, be not made, it must surely be owing to some strange neglect or remissness in a matter of very great moment to this community.

The pears presented, it is believed, have been seldom surpassed in this place. In other places, as recently at the Norfolk county exhibition, more varieties have been presented, for, one individ-

ual there, presented one hundred varieties of the pear, yet the committee believe they could not have been finer specimens than those sent in by Mrs. John W. Wilson, of this town, who presented twenty-two varieties. And next in excellence were the twenty-four varieties of Edward Clarke.

Few among us are perhaps aware of the profit that may result from the raising of one variety of a single family of fruits. The committee invite attention to a condensed statement:—

A Virgalieu pear tree has been known to produce, on an average, twenty bushels, annually, for twenty years. This crop has been sold for $2 per bushel. Thus the profits of a single tree have been $40 a year, for the last twenty years. In another case, the profits of these pear trees have been annually from $84 to $105. The owner was offered $100 a tree for them, and refused it. One gentleman sold his crop of thirty barrels, year before last, in the city of New York, for $15 a barrel, equal to $450. This fruit was from a young orchard, containing several hundred trees. It yielded, last year, about fifty barrels. These at $15 a barrel, would bring $750, as much as twenty acres of wheat would bring last year. An acre of one hundred large trees would average, at least, thirteen bushels each, equal to 1,300 bushels, which, at the New York price, $15 a barrel, (three bushels to the barrel,) would bring $6,500. This statement tends to show us, that few understand the profit derived from the delightful employment of raising fruit.

There were some fine specimens of the cranberry raised by Spencer Root, of Williamsburg, and Horace Jepson. Mr. Root has a field of two acres, which, it is understood, he has begun to cultivate. A box of prunes, prepared by Mr. Tribus, of this town, and of tomato figs, by Mr. Dickinson, of Hadley, deserve high commendation. If such fruit can be raised and prepared here, it certainly deserves great encouragement. There were a few peaches also on exhibition, of an excellent quality.

The committee, in closing, would not fail to speak of their great gratification in viewing the fine display of grapes—a fruit not the least in importance and value among those on exhibition. The varieties exhibited were the Isabella and Catawba. The grapes on the tables were fewer than might have been expected. A fruit so healthful, so delicious, and so easily raised, should induce many to cultivate it. It may be that the general

cultivation of the grape on all our valleys and hills, will do more for the suppression of an evil existing to some extent among us, than all the prohibitory liquor laws have hitherto done, how essential soever these may be deemed to the welfare of society. A chaplain in the United States Navy, writing from the Mediterranean recently, says: "It is a fact, all Italy is drinking, all Greece and all France, and there is *no* drunkenness;" and he adds, "perhaps the remedy for us is in the universal cultivation of the grape." However this might prove, on trial, a much greater attention to this choice fruit is demanded—fruit that may be kept in all its original freshness and flavor for our tables in mid-winter, as in autumn—thus amply repaying all care and toil in the gratification it would afford to the appetite, and the healthfulness it would give to the physical system.

L. WRIGHT, JR., *Chairman.*

HAMPSHIRE.

From the Report of the Committee.

GRAPES.—The specimens of grapes were well ripened and of excellent flavor. A raisin Isabella was particularly delicious. Some very fine specimens of foreign grapes were brought into the hall by Orin Sage, of Ware: the varieties were the White Grape, White Nice, Austrian Muscat, White Bual, White Sweetwater, Royal Muscadine and Syrian; of the dark varieties, Black Hamburgh, Victoria Hamburgh, Red Tarminer and Gridley Fontigau. The magnificent clusters of the Hamburghs, and the transparent delicacy of the lighter varieties furnished a pleasant temptation to the palate. Any one must have felt full of grape, while mentally drinking in these Sweetwaters; and we should not be very much surprised if some *shooting* affairs should come off next spring, as the result of the hot-headedness produced by this infusion.

We understand that these grapes are raised under glass without fire—the temperature of our climate being elevated enough to ripen the fruit, if the sudden changes of weather can be guarded against.

It seems surprising, in view of the little expense and labor involved, that more attention is not paid to the cultivation of the grape. As a luxury, and a healthful article of diet, this fruit is unsurpassed. Besides this, necessity seems to be forcing upon our consideration the home production of wine. It is notorious, that it is almost impossible to obtain a pure, foreign article. This fact has already driven many persons to the manufacture of currant and other varieties of wine which cannot compete in quality or facility of manufacture with the juice of the grape. Experience has already shown that no foreign wines can surpass those produced in the middle and western States. The Catawba, manufactured in Ohio, has a less proportion of alcohol than the most highly esteemed and delicate champaignes of Europe, rendering it on that account superior to any other variety. There is no reason why its production may not be increased to any desirable extent, thereby insuring a pure article, for whatever use it may be necessary.

The quinces were very fair specimens, some of them very large and fine. In addition to the premiums, several gratuities were bestowed. There were a few plates of nice looking peaches. They received gratuities.

A box of tomato figs very closely imitated the article they were designed to represent. There were some fine specimens of cranberries, and a few barberries upon the tables.

FRANKLIN BONNEY, *Chairman.*

HADLEY.

HAMPDEN.

Report of the Committee on Fruits.

In this valley, the scarcity is the great fruit-fact of the season. Two dollars per bushel for apples, begets the inquiry among all classes, "How comes it? Is it a freak of nature, or the result of nature's laws? Is the fault in ourselves, or in our stars?"

That fickle goddess, the weather, concerning whom all people in civilized countries make daily inquiries, seems, occasionally, to play serious jokes with the fruit interest. But scientific men, among whom Guyot, Espy, Redfield and Lieut. Maury are prom-

inent, have been trying to subject winds, rains, frosts and snows to "law and order." The success of Lieut. Maury in determining the winds of the ocean, leads to a reasonable hope that, as the ships by his science are enabled to avoid the hurricane and the tornado, so the farmer may know the times of the early and the late frosts of spring and autumn, and the sharp killing frosts of winter, and avail himself of all the advantages which such fore-knowledge would give him. Hundreds of observations upon the weather and correlated phenomena are recorded daily in different parts of the country, and these are subjected to the inspection and generalization of some of the best minds.

That the scarcity of fruit this season is due, in a great degree, to the weather, may appear from the localities where it grew and where it did not grow. So far as our observation extends, the apples of this season were grown upon elevated situations, on land inclined to the south-east.

The apple has great power to adapt itself to climate. In Canada, it endures the cold, but the fruit is small, compact and hard, keeping well during the year. In more southern latitudes, it grows larger, more tender and luscious. The same variety takes different characters in the same latitudes, as its locality varies from the Atlantic toward the Pacific, on hill or in dale, on the prairie or in the river valley, but extraordinary fluctuations in the climate to which it is habituated, spoils the fruit. Peaches were quite abundant on the hills of Barre, and upon the still higher hills of Leyden, Coleraine and Conway; but in these towns there were no peaches in the valleys between the hills. It is well known that cold air is more dense than warm. In calm, cold weather, therefore, the valleys will be filled with a stratum of cold air—many degrees colder, frequently, than that which covers the tops of the hills. And again, the heat at mid-day, reflected by the bright snowy hillsides, is concentrated in the valleys, so that by thawing at mid-day and freezing intensely at night, the tender germ organs, though done up nicely in the bud, are killed in the valleys, while upon the hills, with more uniform temperature, they survive.

Another fact well worth the attention of the society is, that the best orchards are upon the mica-slate and red sandstone soils. We think trees will grow as well and produce as abun-

dantly upon the latter, as upon the former, but the sandstone being lower, the crop is more likely to fail. On the drift, but little fruit is raised. Clays mingled with the soil at the time of planting, will help the trees much in bearing time.

Few farmers raise pears. Those who have tried, have been disappointed—the trees have blighted. They must know that the pear needs care. It must be mulched. We suggest that pear-seeds be sown where you want the trees to stand, and then graft the desired variety at the proper time. The tap root is of great importance to the tree. Few species of trees, perhaps none, will live as long without it, as with it.

The cherry is a hardy and rather beautiful shade tree, and though it might not generally be chosen for that purpose alone, yet taking the fruit into consideration, we can hardly account for the fact that so few are seen upon the farms of the county. Without hardly any expense, they will beautify the farm, and the fruit, coming as it does when we have neither apples, peaches nor pears, is a real luxury.

The peach trees that are alive look healthy, and if we have a favorable winter and spring, we anticipate a crop next season.

OLIVER MARCY, *Chairman.*

WILBRAHAM.

NORFOLK.

Statement of Thaddeus Clapp.

PEACHES.—The peach orchard offered for inspection contains 146 trees, set out, a part in 1854, the remainder in 1855. They are from stocks raised on the place, and budded with the early Crawford. The trees, when set, were two years from the bud, and stand in rows, fourteen feet apart, and at intervals of twelve feet in the row. The trees of one row are placed, not at right angles with those of another, but obliquely, so as to receive to the best advantage the sun's light. Perhaps a greater interval between the trees would have been better; but it was expected that, by an annual shortening in of the branches, they might be kept within due compass.

The trees have borne fruit the past season, but only in small

quantities, having suffered, in common with others throughout the country, the effects of cold the previous winter.

In pruning, the shortening in method has been followed, the object being to give a round apple-tree shape to the tree, and to prevent overbearing. The time selected for this purpose has usually been the last of March or beginning of April.

For the prevention of the borer, various remedies have been tried, but none with so much success as whitewashing. This has been done two or three times during the season, commencing about the first of July, and repeated at intervals of three or four weeks. The wash was applied to that portion of the trunk extending from the surface of the ground, twelve to eighteen inches above and two to three inches below, the earth being removed to this depth, and a careful examination made for the borer at the same time. After whitewashing, the earth was replaced and hilled up about the trunk, three or four inches. This method has usually been found sufficient to protect the root; but if prevented from depositing its eggs there, the parent insect will not unfrequently resort to other parts, as to the forks of the branches, or any wounded or diseased spots, unless similarly protected; so that to insure complete exemption from its attacks, a careful inspection of these parts also becomes necessary.

Another insect noticed in the peach tree is a small beetle, not larger than a grain of mustard seed, of a black color, which makes for itself a lodgment in the bark, causing the gum to exude, and so giving an unhealthy appearance to the tree. It is found in considerable numbers, the latter part of summer, imbedded in the bark, particularly of old trees, and its perforations then may be easily mistaken for those of the young peach borer. The injury, however, which it does, is much less, and may be prevented by the application of a coat of whitewash to the whole trunk.

Dorchester, December 6, 1856.

Statement of John W. Shaw.

Apples.—The apple orchard which I offer for premium was planted on high, dry and strong land, in April and November,

1852. It consists of 105 trees, 80 Baldwins, 15 Rhode Island greenings, and 10 russets.

The holes were made four feet in diameter and two feet deep, and a one-horse cartload of compost of meadow mud and loam was put into each hole before setting the trees. In 1853, I raised a crop of oats, and laid down the land to grass; but the grass not taking well, in November, 1854, I ploughed in, and 1855 raised a crop of potatoes, and the present year corn.

GRANTVILLE, November 14, 1856.

From the Report of the Committee on Flowers.

The committee feel they have cause to congratulate the society on the complete success of the floral exhibition. When it was first proposed to arrange a table for the display of flowers and bouquets, the project met with comparatively little approbation, and the entire failure, on previous years, to produce even a fair collection, gave great cause for discouragement.

At length, however, suitable stands were arranged, and much to the surprise of many, on the day of exhibition, were well filled with a good collection of flowers.

The success of this display, in 1855, only prompted to greater efforts the present year, and so entirely have the exertions of the committee been crowned with success, that the exhibition not only far exceeded in beauty, variety of flowers and tasteful adaptations, any ever before held in Norfolk county, but almost rivalled the splendid displays of the Massachusetts Horticultural Society.

It is a great and prevalent error to suppose that flowers are only for ornament, and therefore of no practical use; one of the first principles of refinement is found in the love of the beautiful in nature, and most certainly in no department can beauty be studied in more pleasing and more varied forms than in the floral kingdoms.

It is not necessary that, in the pursuit of the useful, the beautiful should be wholly neglected and overlooked; beauty gives the charm to utility, and robs the stern practical of much of its harshness.

Norfolk county has reason to be proud that she has been the

first to introduce such a pleasing element into the annual county fairs, for it is the belief of the committee that in no county of the State is the "cattle show" graced by such a pleasant feature.

It is but in justice to the contributors, that the committee notice some of the principal features in the floral exhibition more at large.

The display of Mr. Hunnewell was most excellent, and the committee must accord the highest praise for the beautiful and tasteful arrangement of his contributions. The beauty of one basket of flowers could hardly be surpassed.

Mr. Barnes presented a most magnificent show of dahlias, which, in themselves, were a feature in the exhibition. These, and the choice display of roses from Mr. Davenport's, attracted universal attention.

The displays of Messrs. Stone and Rand were very large and varied, but were not entered for premium.

A new seedling verbena, "Rob Roy," presented by Robert Watt, and for which the first premium was awarded, bids fair, in the opinion of the committee, to rival many long established favorites. The color is a most dazzling scarlet, which contrasts beautifully with the pale white eye; the petal is firm and very large; habit, strong and vigorous; foliage, large and of a dark glossy green.

In conclusion, the committee would signify their entire satisfaction with the exhibition, and can only express the wish that the displays of coming years may more than justify the bright hopes they form for the future.

EDWARD S. RAND, JR., *Chairman.*

NANTUCKET.

From the Report of the Committee on Fruit.

The committee on fruit for the first exhibition of the Nantucket Agricultural Society, have attended to the duty assigned them, and beg leave to report:—

When we consider how very recently the opinion has taken root, that fruit can be successfully grown on Nantucket, we

would express our surprise and pleasure at the display made on this occasion. It affords to our minds ample proof that the efforts made have been rewarded with good success, and offers sufficient encouragement to stimulate us and others to persevere in the pleasing and useful task. One hundred plates and baskets of fruit graced the tables of the exhibition, from thirty-six contributors.

Of pears, there was a good display, both in number and quality. Twenty-two varieties were shown.

James Thompson exhibited ten varieties, which your committee considered the best collection. Mr. Thompson's specimens were are follows: Flemish Beauty, Beurre Diel, Beurre d'Aremberg, Duchesse d'Orleans, Seckel, White Doyenne, Soldat Laboureur, Osband's Summer, Bon Chretien Fondante, Louise Bonne de Jersey.

Edward W. Gardner exhibited five varieties—White Doyenne, Jalousie de Fontenay Vendee, Colmar d'Aremberg, Duchesse d' Orleans, and Vicar of Winkfield.

Of grapes there was a good display, although not so rich as it might have been had the vines on the Island been fully represented. We hope more attention will be given to the cultivation of this wholesome fruit, of which Professor Salisbury says, "the free use of ripe grapes (and apples) not only prevents disease, but their regulated enjoyment helps to remove that which already exists. They are superior to the potato in the principles that go to increase the muscle and the brain of man."

Of quinces the collection was good. Of apples but few were exhibited. Edward W. Gardner offered specimens of Rhode Island greenings, that were very large and handsome.

The committee noticed among the fruit some dishes of strawberry tomatoes, and a jar of pickled strawberry tomatoes, exhibited by Mrs. E. P. Fearing. The fruit of the hickory tree—shellbark nuts—was exhibited by Z. Coffin Macy, three kinds, from trees on his farm. The show of peaches was small.

The culture of fruit commends itself to all of us as a matter of taste, and as a means of obtaining what may be considered a luxury as well as an article of diet conducive to health. As a matter of taste, a fruit tree, with its foliage, blossoms and hanging fruit, in their successive seasons, is an ornament wherever seen, and may certainly be called "a thing of beauty." As an

attainable luxury, it offers tempting inducements to persevering attention to the cultivation of such kinds and varieties as are best adapted to our soil, climate and situation. Fruit being a wholesome, palatable and nutritious article of food, needed for the preservation of health, and preventive of disease, its culture should be considered a subject of much importance, and worthy of all the investigation, labor and patience, required.

J. B. King, *Chairman.*

VEGETABLES.

Sweet Potatoes.—The following statement, concerning the sweet potato, was furnished by Caleb Bates, of Kingston :—

I ploughed an acre and a half of poor sandy soil, threw it into ridges, a part of which had a little manure, the scrapings of my yards, and transplanted the slips, forced in hot-beds, and obtained three hundred and fifty bushels,—sweeter, as hundreds will testify, than those brought from the south. The crop would have been doubled with proper fertilizers and cultivation. The season was as favorable as will average. The sweet potato is as sure a crop as that of Indian corn.

[The sweet potato is said to be a native of both the Indies and China. It was introduced into Spain from the West Indies, and soon after into England, and sold as a delicacy, and is the potato of the old English botanists, the common potato then being unknown. The stem is round, rough, prostrate, creeping, sending out purple flowers, and producing scattered, oblong tubers, of a pale green color, and, in a genial soil, to the number of forty or fifty, bearing a close resemblance to those seen in the market from the Carolinas. It is a tropical plant, and cultivated in a manner similar to the common potato, but requiring more room for its trailing stems, which grow to the length, sometimes, of eight or ten feet. Attempts were made to cultivate it

in England, about the middle of the fifteenth century, but they failed. In 1597, Gerarde experimented with it in his garden, but it drooped by reason of the cold. Large quantities were imported from Spain and the Canaries, about that time, and used as a dessert.

Its propagation here, as in the national garden at Paris, according to the foregoing statement of Mr. Bates, is, by starting plants in a hot-bed, whence they are transplanted to the garden or field, and cultivated like the common potato. Favorable crops have been produced in this way here, and hopes are entertained by some, that it may yet be so far acclimatized as to render its cultivation economical in this State. Mr. Bates's experiments, as set forth in his statements of the last two seasons, seem to show, that all who desire to raise this luxury, can do so by starting the plants in a hot-bed, (which every farmer can provide for a moderate outlay,) and transplanting at the proper time to ground prepared for their cultivation.—Ed.]

ESSEX.

From the Report of the Committee.

The number, quality and variety of specimens on exhibition in this department, were pleasing proofs of the high state of agriculture in the vicinity. Squashes, potatoes and cabbages were exhibited in great variety, and gave character to the exhibition. Among the cabbages we noticed three heads of a gigantic size, weighing over forty pounds each. As our Celtic brethren value the cabbage in proportion to its size, this monster variety finds a ready and profitable market, and must therefore be worthy of the attention of those farmers who supply our city markets.

The exhibition abounded in mammoth squashes. This feature was certainly favorable to the funds of this society, for huge exceptions will always draw the masses, but does it promise well for agriculture? We hope that this portends no monster squash mania, for none of those exhibited, as far as could be ascertained by inquiry, were reliable as a good table squash; on the contrary, some of the finest looking, including those splendid ones, round and flat in form, of a rich orange color, were, in quality, among the poorest.

Their only sphere, therefore, if they have any, must be as food for cattle. But will they prove profitable for this end? Will not the pumpkin still hold its own, or root crops pay better (as some good farmers believe) when the great spread of the vine in some or all of these large varieties, the degree to which they exhaust the land, and their coarse, watery structure, is considered? As three or four of these monster varieties have lately been introduced, we deem their relative value as food for stock a matter well worthy of the examination and careful experimental test of some of our intelligent farmers, who would give the results due publicity. S. A. Merrill, of the Derby Farm, Salem, and Henry Shoof, of Newburyport, each exhibited a mammoth species; the chairman of the vegetable committee has the seed of another variety, and he would be happy to unite with these gentlemen in supplying seed to any intelligent farmer who will make the above experiment, and give it due publicity through some agricultural paper, circulating in New England. If the comparative value of these large varieties be the only fact ascertained, the experiment will prove a valuable one.

Squashes are raised for stock, for pies, and for the table; now here are three distinct uses, and as division of labor is favorable to perfection in the arts, why might not a classification of the varieties of the squash, based on these three distinct uses, tend to improve them, and drive from the market many unworthy mongrels?

The crookneck and marrow are now generally acknowledged to be our standard squashes for the table, and thanks to our city epicures, the demand for the pure marrow must ere long eliminate the cross of the African and South American varieties, by which it has become deteriorated. Our farmers will find it for their interest to second the efforts of the gentlemen who lead reforms with a silver string. But there is a homely, almost unknown variety, which, if its looks were equal to its merits, would drive the marrow from the market. We refer to the Hubbard squash. This is of the size of the pure marrow, about as prolific, full as hardy, and in every other respect its superior. It is sweeter, mealier, thicker-meated, of as fine a grain, and richer flavor, and keeps with no unusual care well into the spring. Its color is dark green, of a dirty, dusty hue on the surface exposed to the sun; sometimes of a lead color. Is can be easily distin-

guished from other green varieties, with which it is sometimes confounded, by its thick shell, which in pure specimens cannot be cut with a knife. This best of table squashes will always have the splendid orange color of the marrow to contend against, but if the public vote be in accordance with the old proverb, that "handsome is that handsome does," it will certainly supersede it as a table squash.

There were several good specimens of the custard or "California" squash on exhibition—long, flesh-colored, in shape like a pumpkin. This squash is generally inferior for the table, but as a pie squash, with its peculiar and excellent flavor, is considered by many of the first quality. In some locations it is an enormous bearer, yielding as high as fourteen tons to the acre. As a pie squash, we consider it a valuable acquisition.

Among the new products on exhibition, whose place in our agriculture is yet to be determined, we noticed the Japan pea, Chinese sugar cane, and Chinese potato. The first two of these have been widely distributed through the patent office. From specimens raised this season, we note, that the Japan pea is of small size, and the pod contains two or three peas; it is a great bearer, the pods hanging in clusters at the footstalk of each leaf, from three to seven in a cluster, and numbering as many as ninety on a single stalk. From a slight knowledge of its quality, we consider it of superior flavor, much like the Lima bean. It appears to require no sticking, being but little of a runner, and having a good deal of fibre in its stalk. In its habits of growth it reminds one of a mongrel between the bush and pole bean. Who will favor the public with the results of careful experiments, to determine the value of this and the Oregon pea, (provided this latter can be raised, we have not succeeded,) for fodder? We remember that Dr. J. V. C. Smith, in his "Travels in Egypt," states that the fine Arabian horses are fed mostly on a mixture of chopped straw and beans, a small quantity of each. We have not at this moment the work by us to give a literal extract, but if through many generations the finest race of horses in the world has held its own on such food as this, there must certainly be great value in it, and the question naturally arises, why might not this be as good food for the horses of other countries? Is there any thing in our climate, or the use to which the animal is here put, which forbids the same food? The prolific habits

of the Japan pea, and the value of the stalk as fodder, may serve to draw attention to the statement of ex-mayor Smith.

The Chinese sugar cane, to reach maturity, requires a season of about five months. Seed planted June 18th, attained a growth of nine feet before the first heavy frost. The seeds, which are black when ripe, had just begun to turn of a reddish hue; the saccharine matter was so far advanced, that, by simple means, about a third of a gill of a rich, sugary molasses was made from a single stalk. At this stage of its growth and for some weeks previously, the casing of the pith was so extremely hard as to remind one of bamboo or cane-pole, being altogether too hard for fodder. The condition of the stalk at an earlier period of growth, was not noted. Should this hard casing be a characteristic of it during a large portion of its period of growth, our farmers may well hesitate to plant it for fodder. From details given relative to its extensive culture in France, it appears to be a "molasses" cane, rather than sugar cane, as it was found extremely difficult to granulate the sirup. In an interesting and able article published in the London Times, giving the results of extensive experiments made by a gentleman in France on the different varieties of the cane, with reference to their profitable culture in the north temperate zone, it was stated that several of the varieties proved preferable to the Chinese sugar cane in the two important respects, that their sirup granulated far more readily, and they reached maturity much sooner, one or two of them perfecting their growth in three months. As the source from which this information comes is of so high a character, may we not anticipate the introduction into this country, through the agent in France of our efficient patent office, of other varieties of the cane superior in these two respects to the Chinese variety?

It is a question of the first importance, can we in the North profitably raise our own sweetening? This is a matter worthy of the most extended research and experiment. We have no substitutes for sugar and molasses. If any of our grain crops, even Indian corn, was stricken from the products of the North, we could find substitutes, but for the sugar and molasses we have none. Then consider the large proportion which these two articles make of the expenses of every household, and consider, too, the great price at which they are selling, and who

can doubt that the introduction of a variety of sugar cane adapted to our soil and climate, would prove a greater boon than even our great grain staple, Indian corn, has proved to the farmers of New England? Now to whom shall we look for the requisite funds and the extended research, necessary to place in the hands of intelligent agriculturists the means of thoroughly determining this important point, but to our efficient patent office? It is a pleasant thought that our tariff sugar and molasses, designed for the benefit of the inhabitants of a small section of the country, may, through an overruling Providence, cherish in its infancy the growth and manufacture of the same throughout the Union, and thus bless the whole country.

The few specimens of Chinese potato on exhibition were of small size, though a friend informs us that they have been raised twenty-eight inches in length during the present season. In the present dubious state of the potato, any proposed substitute must at once draw attention, and we have too much confidence in our staid farming community to believe that they will go into any mania in its culture, until thorough trials, reported from reliable sources, shall assign to it the place it deserves in our agriculture. Prince, of Long Island, in circulars scattered broadcast over the country, considers it "the greatest vegetable boon ever granted by God to man!!" A friend who has raised this vegetable the present season, informs us that it grows like a carrot, with a single root extending deep into the soil. He considers the quality as excellent, and states that it abounds in starch even more than the common potato. If this is so, then Mr. Prince's position, "that it is more nutritious than any other esculent we cultivate," also, "that it is perfectly competent to make good bread, similar to that of wheat," sounds much like an attempt to blow a big trumpet without the necessary wind.

The report of your vegetable committee, is founded on the eye-test—they report on what they *see*. The most essential characteristic, the *quality* of what is presented for their notice, is, by the present system of examination, ignored; yet this is what governs all of us in receiving or rejecting the products for table use. No article that receives a premium for its large size and good looks, is therefore approved of as a good article, in the usual sense of that term.

Under the present system, there appears to be a contradiction between the principles and practice of the society The society would encourage the growth of that which is actually good; whereas no committee on vegetables will or can ground their report on any such basis; they can only certify by their premiums or gratuities to what *looked* good, but would not for one moment be supposed to convey the idea, that these premiums or gratuities indicated to any degree of accuracy the rank which the articles deserve to hold for table use. We would therefore recommend that cooked specimens of certain classes of the vegetables exhibited, shall accompany them. At late exhibitions, for example, new seedling potatoes have abounded; also, new varieties of the squash. If your committee could report on the real quality of specimens in each of these classes, they are of the opinion that the value of the report would be greatly enhanced in some departments. The exhibition of vegetables was considered as remarkably fine, in the number and variety of squashes and cabbages.

James J. H. Gregory, *Chairman.*

HAMPDEN.

From the Report of the Committee.

Your committee have the pleasure of witnessing an increasing competition in this department of the society's exhibition. The present display of vegetables, both in quantity and quality, has never before been equalled in this county, and we venture to say, seldom in New England. This is just as it should be. The Valley of the Connecticut, with its rich soil and warm exposure, has an advantage over many portions of the State. And we rejoice to learn that our leading cultivators are striving in honorable competition to bring to perfection the products of the garden.

The show consisted of two parts, the single specimens and the collections. The single specimens alone were not a whit behind former years. We were pleased to notice among the contributors, editors, doctors, lawyers, master mechanics, as well as farmers and gardeners, showing that men of every class still

find their relaxation and delight where our first parents found the home of their innocence—in a garden. We notice one specimen, which we beg leave to call *squash the great*, nearly two yards in circumference, and weighing ninety-seven pounds. But large as it was, we found a variety of cucumbers more than long enough to put an entire hoop around its portly waist. Other squashes there were, worthy of mention. We noticed one loving family of twenty-two members, that had lain in the autumn sun around a single hill.

But the collections were the "observed of all observers." This portion of the show stands without a rival in any thing we have ever seen. Each collection was little less than a stack of vegetables, a pyramid of garden sauce. It is easier to tell what was *not* there, than what *was*. There were egg-plants, cauliflowers, onions, peppers; there were carrots long enough to be the "staff of life;" there were cabbages large enough to show that it was no *small* thing even to be a cabbage-head now-a-days; there were *beets* that could not be *beat;* there were nearly thirty varieties of potatoes, and finally "some pumpkins." In fact, from the top of the beanpole to the bottom of the parsnip-root, there was no part of ordinary gardening at this season left unrepresented. The congress of garden vegetables was full. There was no room for a minus sign any where. In a word, it looked *sauce*-y!

There were six separate collections, varying from forty to eighty varieties. They all take a premium, and deserve it. After disposing of premium number one, (which was not difficult,) the only doubt seemed to be as to the *order* of the several competitors. If injustice has been done, it is because it was impossible to decide. There was also a collection of twenty-four varieties of potatoes, raised by one person, to which the committee attached some adjectives of praise. The inquiry was raised, whether all the exhibitors were the actual raisers of every article exhibited. If not, every person having so offended, will remember that, according to the rules of the society, and all justice, they are entitled to no premium.

In closing, we beg leave to add: The subject is an important one. All the community are not farmers; but almost without exception, every householder is a raiser of vegetables. Every house has the suburb of a garden. How important, then, that

the garden be rendered productive. A very large portion of the stuff that life is made of, comes from this source. We have seen to-day what every garden may produce. Let us not only admire, but imitate. It is said that one of the ancient popes pointed with pride to the cabbages he had raised. Would that popes and kings had never had a meaner ambition! Your committee suggest that it is no unworthy object of ambition to the husbandman to have a good garden. Let our future improvements in farming then, extend into horticulture as well as agriculture.

And they would also say to the husbandman's *wife*, that American women notoriously suffer for want of free and vigorous exercise in the open air. Why may we not assign to them at least a partial care of the garden? Their hands might possibly lose somewhat of their accustomed whiteness and softness if they were taught to handle the garden rake and hoe. But if their hands were a little more brown, their cheeks would certainly have a little more

"Rosy red, love's proper hue."

Why then may they not, like their mother Eve, visit the garden at sunrise, and pay a sisterly regard to the vegetables and flowers? We never see woman so employed without thinking of

"Proserpine gath'ring flowers,
Herself a fairer flower!"

W. C. Goldthwait, *Chairman.*

DOMESTIC MANUFACTURES.

MIDDLESEX.

From the Report of the Committee on Bread.

The rise and progress of agricultural societies, and the stimulus the inventive genius of the age has received by a wise and judicious disposition of premiums, have caused mother earth to bring forth many productions that would have been considered monstrous phenomena by our ancestors of the last century. We

find in many gardens at the present day, plants bearing eggs that rival the joint efforts of the Chittagong and Shanghae shrubs, producing an esculent that is all oyster and no shell, vines rejoicing in mammoth custards, and we can scarcely travel upon any of our railroads, without having thrust in our faces "ready made thimbles" that grow on trees. But, notwithstanding the certain and sure remuneration and fame, that always attends the discoverer of any thing new in science, arts or agriculture, no Yankee has yet appeared upon the stage, of sufficient cuteness to ingraft into our soil any banyan tree, that in this climate will daily supply us with hot rolls for our breakfast. Despairing then for the present, of receiving this luxury immediately from the ground itself, and being aware that we are now, (as we ever have been since the day king Alfred made so signal a failure in the baking business,) thrown upon the tender mercies of our wives and daughters for our supply of this article, and fearing lest the aforesaid wives and daughters, becoming weary of well doing, and infected with some of the labor-saving notions so prevalent at the present day, would fall into the habit of making up bread with some of the one thousand and one patent bread-making nostrums that are advertised daily in our newspapers, the trustees of this society have offered premiums "for the best home-made wheaten bread made with yeast," &c., and by offering such premiums, the trustees have acted with a shrewdness that would have done credit to those inhabiting a locality farther down east than Middlesex county; for in this practical age, they, (unpoetically perhaps,) considering the fabrication of good bread one of the qualifications of a good wife, by offering premiums on the former, not only secure perfection in its manufacture, but provide the community with the latter without a specific premium therefor. Taking this view of the question, your committee being impressed with the high and responsible nature of the trust reposed in them, and that their verdict might have more important and permanent results than the mere settlement of the question as to the respective merits and demerits of two adjoining loaves of bread, entered upon their duty with all the solemnity that so grave a subject demanded, and made a full and careful examination of all the specimens presented.

Your committee, in conclusion, request that the applicants

for premiums in the future would be careful to state more definitely their ages, and our fair friends may rest assured that any knowledge so obtained will never be used to their prejudice.

Geo. M. Brooks, *Chairman.*

MIDDLESEX NORTH.

From the Report of the Committee on Bread.

The committee to whom was assigned the duty of awarding premiums on bread, have dissected and tasted the several specimens presented, and would take this opportunity to congratulate the husbands and fathers upon the happy results to which their wives and daughters have come in reducing their several theories to practice, in the manufacture of so much good bread as has been exhibited to-day—an article much needed in this community, and entering so largely into our food that it has long been designated "the staff of life." The vast improvement in this article, the last few years, is attributed, in a great measure, to the judicious step the trustees of agricultural societies have taken in awarding premiums as incentives to rouse the latent powers of the female mind to produce something better than has been made before. Is it a matter of economy, husbands and wives, to patronize the baker, who makes music in our streets with his jingling bells, to notify us to be on the look-out, lest we fail to replenish our pantries with his dry and hard crackers, his biscuit and brick loaves, (light as air, to make us think he has given us good bargains,)—large enough, at least, for the price, but when broken, are like the puff-ball of pumpkin size, which, if pressed, contracts itself so that it may be put in a nut shell? Would it not be better policy to give the extra money you pay the baker for making his bread, (over and above the raw material,) to your daughters, to encourage them to roll up their sleeves and march up to the kneading trough, and make an effort to grace your family tables with their domestic loaves, instead of the inferior articles furnished by the baker? We are paying too dearly for our bread from the baker's cart. The time, we hope, is not far distant, when mothers will feel that their daughters are not qualified to become helpmeets to

their husbands, unless they understand thoroughly the science of making good wheaten and brown bread.

The number of candidates for premiums on wheaten bread was nineteen; on brown bread, six. The competitors presented their recipes, full and explicit, much to the gratification of the committee. Their theories and results were so much alike, the committee had some difficulty in coming to a just conclusion upon their respective merits; yet, after discussing and thoroughly putting their tastes upon trial, they came to the results indicated in the preceding awards. The committee found ten loaves deficient in weight, a fact contributors will do well to remember.

ALDEN P. OSGOOD, *Chairman.*

FRANKLIN.

From the Report of the Committee on Bread.

The committee on bread would report a large assortment on exhibition, the quality of which for the most part was excellent; and they would congratulate the good dames of Franklin on their success in this most important branch of the culinary department.

The committee entered on their duties with diffidence, well knowing that each loaf was the result of care, skill, and experience combined, and that each was intended and expected to be the most perfect of its kind,—and that the test of its merits was to be its superior excellence of sweetness and lightness. They were also aware that to treat of any point so intimately connected with a good housewife's reputation as the skilful making of bread, must be a matter of great delicacy; and that however carefully and justly the premiums might be awarded, still some individual would feel dissatisfied. Yet in the performance of the duty allotted them, the committee feel that they have done it to the best of their ability; and they would also state that in making the awards, the decision was in nearly every instance unanimous.

Several entries were not examined in consequence of a failure on the part of the makers to comply with a rule of the society,

which "requires that a written statement of the process of making shall accompany each loaf."

The numerous entries of wheat and rye in contrast with the few premiums to be awarded, compelled the committee to pass with only general notice on a number of specimens of superior excellence; among these were several loaves of rye, one of the staple products of Connecticut Valley, which the eye could not distinguish from the best western wheat.

In a number of instances in the process of making, the sweetness of the bread had been sacrificed for lightness; and in like manner in other cases where the sweetness had been preserved, sufficient time had not been allowed for it to rise before baking. Here two points of sweetness and lightness seems to be the Scylla and Charybdis of bread makers, for in endeavoring to avoid the one extreme they fall into the other.

Thorough baking is also an indispensable requisite to good bread. The light or slight bake may suit the eye that wishes to see the bread retain the primitive color of the dough. As for ourselves, we are not partial to dough. Give us that rich, brown color that a good thorough bake imparts to the loaf. If the bread has had the honor to pass through the oven, let it not look as if it were ashamed to acknowledge the fact. Aside from color, the taste is a sure criterion to detect the quality of the bake, as the native sweetness of the grain can be brought out only by a thorough process of cooking; and the same process is requisite to its most perfect and easy digestion.

As one object of the society is to disseminate useful information in all departments of domestic economy, the committee herewith present the written statements which accompany those entries that have received premiums.

Although a majority of the committee are partial to the use of hop yeast, yet they are constrained to give the premium in favor of such a lively sponge-like texture as was exhibited by Mrs. H. L. P. Bardwell, of Shelburne. The loaf proves the maker to be thoroughly versed in the mysteries of the art. The following statement accompanied it:—

"One cup of new milk, one cup warm water, one-half teaspoonful of salt; sufficient flour to make a thin batter,—kept in a warm place four or five hours. When risen, I took two cups of the yeast with new milk,—a piece of butter the size of a wal-

nut, and with what flour I wished, made a stiff batter; which being soon risen, added more flour and kneaded thoroughly: after rising, baked three-fourths of an hour."

Mrs. C. B. Hubbard, of Sunderland, exhibited rye bread, which, for its extreme whiteness, sweetness and lightness, elicited the admiration of all. The following is the process of making:—

"This bread was made of flour, from rye of our own raising. The dough was mixed the night before, and raised over night, then kneaded well and put into the bake pan; when raised enough, was baked in a stove over one hour. The dough was raised with hop yeast."

Kate Burns, of Greenfield, presented a most excellent specimen of wheat bread; and what was much in its favor it had a thorough bake.

With the loaf we find the following statement:—

"One quart of flour, one-half pint of water, one spoonful of yeast; baked one hour."

Susan Newton, of Greenfield, exhibited a fine article of wheat bread, which for all the requisite qualities of goodness is seldom equalled. The following is the process of making:—

"Take five quarts of flour in a kneading bowl at night, mix one-half pint of yeast and one-half pint warm water in the centre of the flour. In the morning knead it stiff with new milk and let it rise three hours; then knead it very thoroughly and let it rise half an hour in the tins. Bake one hour in a brick oven."

Yeast.—"Boil one ounce hops and one white potato, cut in slices, one quart of water, mash them and strain upon one pint sifted flour; add hot water to make it a thin batter, and one cup of yeast when cool."

Maria Louisa Davis, of Greenfield, (aged eight years,) exhibited an excellent loaf of bread, made in the following manner:—

"Rye and Indian, equal quantities—to a large loaf, one cup of molasses, one teaspoonful of salt and one cup of yeast; mix it stiff with warm milk."

Mary R. Davis, of Greenfield, (aged nine years,) made the only entry of unbolted wheat,—a loaf of which would tempt the palate of the most fastidious dyspeptic. Made thus:—

"One cup of yeast, two spoonfuls of sugar, a teaspoonful of

salt, one quart of milk, and flour sufficient to make it stiff enough to knead."

Mrs. Oliver Williams, of Sunderland, exhibited superior bread. The following statement accompanied the sample:—

"Part of the meal scalded, one-half as much rye flour as meal, two spoonfuls molasses,—raised with yeast, composed of hops and potatoes grated and boiled; baked in a stove oven."

In closing, the committee express the hope that the entries in the bread department may be more numerous the coming year than they have been the present; and they would particularly call attention to the articles of brown and unbolted wheat bread, of which there were comparatively but few specimens on exhibition this year.

JOEL S. SANDERSON, *Chairman.*

BARNSTABLE.

From the Report of the Committee on Bread.

The competitors for premiums on bread were quite numerous. This fact, your committee regard as a sure indication of good taste and excellent judgment on the part of the matrons of Barnstable county. Bread has well been called the "staff of life," and as agriculture is to productive labor, by which we obtain the means of subsistence, so bread, simple bread, is to the articles of food, by which life is preserved and all the physical powers are invigorated. There is no product of labor or of art which gives more life, more strength, more pleasure than *good* bread, and it may not be considered profaning sacred things, to introduce in this place the fact that bread is the chosen emblem by which our Saviour spake of Himself when He said, "I am the bread of life."

Your committee regretted to find that so small a proportion of the bread presented for examination, both white and brown, was leavened with yeast; much the larger quantity seemed to have been fermented soda and an acid, either in fluid or in powder. We would respectfully recommend that more attention be given to the making and leavening of bread from some kind of yeast; bread thus made being more palatable and nutritious than when fermented with acids and alkalies.

Several specimens of brown bread were so similar in quality and appearance as to render it difficult to decide which was superior, and your committee would recommend that the third premium be awarded to two samples of this description of bread, as will be noticed.

The bread presented by Miss P. K. Bursley, of Barnstable, was made from home grown wheat of the present season. From its appearance and flavor, it was supposed to have been leavened with yeast, and this supposition gave it greater excellence in the judgment of your committee.

To encourage the more general cultivation of wheat in this county, your committee would respectfully suggest the propriety of offering premiums for bread made of home grown wheat.

It is also suggested, as a preventive of dyspepsia, that premiums be offered on molasses gingerbread, and that receipts for making be hereafter required of all who present bread or gingerbread for premiums.

HIRAM CARLETON, *Chairman.*

ESSAY.

ESSEX.

DESTRUCTION OF INSECTS INJURIOUS TO VEGETATION.

BY SAMUEL P. FOWLER.

The close connection in which insects stand to the vegetable creation, renders them deserving the attention of all, and should make them the study of the farmer and horticulturist. It is only by careful investigation, that we may become acquainted with the relative position one holds to the other, and by this knowledge protect ourselves from their depredations. The distribution of insects has been supposed to be in proportion to the diffusion of plants, and that the richer any country is in its vegetation, the greater will be its number of insects and weeds. The same fact is also noticed by English agriculturists, and these opinions coincide with my own, for I have observed how closely they follow the footsteps of the cultivator.

The existence of a small number of insects should be no cause of alarm, as they are essential to the formation of links in the great chain of the animal creation, and are no doubt subservient to great ends, for it is only when found in excess, that they become troublesome,—as for instance the rose bug, (*Melolontha*,) so long as it ravages were confined to the rose, but little was thought of it, and it did not attract the attention of the horticulturist until it became a general feeder.

There are two means of defence against noxious insects: first, those employed by nature, and secondly, those which human knowledge and skill can oppose to them. The means used by nature to prevent or confine the mischief caused by insects, are long continued rains, frequently considered unseasonable, but happening at the pairing time, or during the caterpillar or larva state, cause the death of thousands. Late spring frosts, so much dreaded by farmers, are also beneficial by causing their destruc-

tion. Cold and severe winters destroy many insects in the chrysalis state, particularly if there should happen to be but little snow upon the ground. The formation of ice upon trees serves to loosen and throw off their eggs, which are glued to the branches.

Nature likewise employs the different classes of the animal kingdom in the destruction of noxious insects. Among the mammiferous animals thus used, I would mention the fox, skunk, bat and mole. It is, however, doubtful whether the benefits to be derived from the insectivorous mammalia, or those only partially so, counterbalance the mischief caused by them. On the other hand, birds no doubt contribute much to the destruction of insects injurious to vegetation. And here we would urge upon farmers the importance of affording accommodation, and giving protection to the feathered tribes, and endeavoring, by all the means in their power, to increase their numbers. Cultivators of the soil should never forget, that insectivorous birds are their most efficient auxiliaries in accomplishing the great work of ridding their fields and orchards of insects, and that self-interest alone, to say nothing of humanity, should prompt them to spare those beautiful forms from a cruel death.

Cultivators of gardens, likewise, should endeavor to protect the birds from *feline* rapacity. For there is no object in our grounds so annoying, and upon whose murderous designs our small birds look with so much anxiety, for the safety of themselves and their young, as the stealthy motions of a vagrant cat. These expert bird-catchers should at once be destroyed.

Reptiles, to a considerable extent, are advantageous in the destruction of insects. The *Coluber* genus of serpents, some of which are found on the farms of Essex county, are beneficial in this way, and are perfectly harmless. But innocent, useful and beautiful as they are, both in form and color, they are viewed by too many persons with abhorrence, and every occasion is sought to destroy them. In this connection, I would observe, that in our county we need not fear the bite of but one serpent, the *Crotalus durissus*, or banded rattlesnake, and that its *habitat* is limited to barren and peculiar geological formations, viz.: boulders resting upon ledges of granite or sienite. The other reptile I would notice as being useful to the farmer and horticulturist, is the common toad; and I am pleased to learn, that

this great devourer of insects is coming more into public favor, as its habits are more generally known. It is still, however, by many persons, viewed only with disgust, as it can lay no claim to beauty of form or gracefulness of motion. Intelligent cultivators, however, will not suffer toads to be annoyed, and will afford them protection by placing boards in their haunts, under which they may hide, and screen themselves from the scorching rays of the sun.

But the chief instruments employed by nature in destroying or lessening the number of insects, are insects themselves, namely, those which feed upon others. Among the most useful of these destroyers, I would mention the ichneumon flies, the females laying their eggs entirely in the bodies of other insects, which being hatched, the young parasites fatten on the entrails of their prey, thus literally devouring them alive.

The success with which human knowledge can oppose the increase and depredations of insects, depends very much upon our acquaintance with them, and their economy. For it is by this familiarity with their habits, that we shall discover that there are many of them to be regarded as our auxiliaries and worthy of preservation, while others will be found to be harmless and should be permitted to live out their short period of existence, and enjoy unmolested their few sunny days, or perhaps hours. This knowledge will lead us to avoid the indiscriminating mode practiced by some persons, in destroying the noxious and innoxious insects together. Such, for instance, as the hanging of bottles or other vessels partly filled with sweetened water, on trees, to entrap all sorts of insects to their destruction. These, upon examination, I have found to contain chiefly small bees and wasps, those honest little paper makers, and honey seekers, together with various kinds of flies, possessing, as we may suppose, a sweet tooth, but innocent of the charge of having committed any depredations on vegetation.

The small, handsome beetles, known as lady-birds, (*Coccinella*,) are often destroyed from the mistaken notion that they cause the appearance of the plant-louse, (*Aphis*.) This belief probably arises from the fact, that they are frequently found together. But we should class the lady-bird and its larva among our useful insects, as it feeds entirely upon the plant louse. The careful observer will likewise notice, attendant upon these greedy

sap suckers, a great number of ants, which wait upon them and cultivate their friendship, for the purpose of procuring the sweet fluid they discharge from their bodies. They are their milch kine, and as such are deemed by them worthy of their care and attention.

In regard to our dealings with insects injurious to vegetation, we should use no half-way measures, as they are only calculated to give a plant present relief, or remove the mischief to some other vegetable. Such, for instance, as the use of lime, ashes or snuff, in dusting the plum tree, to prevent the ravages of the curculio. The effect of such a mode of procedure, is to drive the timid insect to the apple or some other fruit tree, but would in nowise lessen its depredations. These methods are not sufficiently sanguinary, and nothing less than their entire destruction, in every period of their growth and transformation, should satisfy the cultivator. It is my intention, in the remainder of this essay, to confine myself principally to insects injurious to the apple tree and its fruit, as by so doing I am persuaded I can best promote the interests of the farmers of Essex county, and attain the object sought by their society.

Of the various insects that infest the apple tree, the most injurious is the canker worm. They appear to have been known at an early period of our history, and are natives of the country, and most probably were formerly accustomed to feed upon the white elm, before entering the orchards of the Puritans. There is an insect described by Kollar, called the winter moth, which is found in Europe, and very much resembles our canker worm, both in its general appearance and habits, which has led some American writers on fruit trees to fall into an error, by supposing them to be identical, and who have in some instances used Kollar's illustrations of the winter moth to represent the canker worm. The chief distinction between them is this: the American female insect or grub is destitute of wings, while the European is provided with short rudiments. The earliest account we have discovered of the ravages of the canker worm in our Commonwealth, was in 1661, and thus related by John Hull: "The canker worm hath for fower years devoured most of the apples in Boston, and the apple trees look in June as if it was the 9th month." In 1770, to prevent the ravages and progress of canker worms, trenches were dug around the

orchards. I think cultivators of the apple may derive some comfort in learning from our early history, that this insect is no new pest, and that past generations have somewhat successfully contended with it, notwithstanding their imperfect knowledge of its habits. The farmers in this county, in those early days, were beset with depredators that are now seldom seen in our fields. What should we think if our clergymen should be compelled to leave their studies, when engaged in preparing their sermons, and shouldering their guns, sally forth to protect their corn fields! In 1711, we find in the diary of the Rev. Mr. Green, of Salem Village, the following passage: "Killed grey squirrels, that devour the corn exceedingly; they have eaten one-quarter of my corn; it is said there are millions of them in the village."

The habits of the canker worm were for many years imperfectly known. Dr. Deane, in 1797, supposed that the grub was produced from the egg of an earth-colored bug, and that "Providence at that time was about to extirpate them, for a kind of little bird had then made its appearance in some parts of the country, which fed upon the canker worms. It was supposed, that if these birds should have a rapid increase, the canker worms would be thinned, so as to be less formidable, if not wholly destroyed." These little birds here spoken of, were most probably the cedar or cherry birds, which have been increasing in numbers ever since they left the swamps and cedar pastures, to reside near the habitations of man and partake of his fruits unbidden, and in kind return have devoured an immense number of canker worms during the past fifty-nine years. But alas! for the Dr.'s predictions, the grubs were probably as numerous last spring as they were in 1797.

In regard to the origin of the word canker worm, as applied to the *Phalæna vernata*, Dr. Deane supposed it originated from the ravages of the insect, having the same effect upon apple trees as canker. If this be its true derivation, given thus early by our ancestors, they must have believed that our insect caused the canker, as they had noticed it in England; for we should suppose that no exhibition of that disease, as seen in this country, would justify them in calling any insect a canker worm. The disease called canker prevails to such an extent in England, that Mr. Knight supposed that apple and pear trees suf-

fered more from it than from any other cause. On the contrary, with us it has always been a slight disease, and very seldom noticed of late years by writers on fruit trees. May not this span worm under consideration, have been named from the circumstance of its cankering or corroding the leaves of the trees on which it feeds, giving them a most singular appearance, that of having been burned with fire—"Bitten with a cankered or envenomed tooth"—*Shakspeare*. Or as the Puritans, we may suppose, were not so conversant with the great poet as they were with the Scriptures, they may have obtained the name from the writings of the prophets, Joel or Nahum, and applied it to the *Phalæna*. We also find mentioned in the Sacred Writings, the Palmer worm, an insect closely resembling the canker worm. Its name implies the wanderer, which is very significant, when we call to mind its habits.

The canker worm belongs to the great order of *Lepidoptera*, and of the group or family of *Geometræ*, or Geometers. They are so very generally known, that a specific description will not be necessary. Since the publication of the late Professor Peck's "Natural History of the Canker Worm," we have been enabled to form correct notions of its habits. A brief description of the insect may, however, be necessary, which is as follows: The male has four wings, and is what is generally termed a miller or moth, of a pale ash color. The female is without wings, and is distinguished from the male by a more robust form of body. In the caterpillar state, they may be known by their peculiar motion, being that of the span worms or lopers, in which they measure the ground, step by step. The female ascends the tree to deposit her eggs in autumn, after the first hard frost, or early in the spring, or even through the winter, should the season prove mild. The grubs made their first appearance this autumn, (1856,) on the evening of the 23d of October, as we noticed them in our grounds. Their eggs are usually hatched about the 1st of May, varying a few days with the season. The young worm, after leaving the egg, remains on the tree from four to five weeks, when it descends to the ground by the means of a silken cord, and quickly burrows in the earth and passes into the chrysalis state, again to issue forth a perfect insect the coming autumn or spring. The female canker worm, or grub, being destitute of wings, can only ascend the

tree to deposit its eggs but by its trunk. Hence various means have been devised to prevent it, such as the following: Tarring the trees in autumn and spring; placing a conical mound of sand heaped around the trunk of the tree; encircling the trees with gutters filled with oil; surrounding the base of the tree with a wooden box, and smearing it with tar; winding around the trunk, tow, cotton and burs; placing upon the ground around the tree muriate of lime, &c. But of all the devices with which we are acquainted, for preventing the ascent of the grubs, the most effective and satisfactory is the tarring of the tree in spring and autumn; we having come to this conclusion, after having for many years tried various methods to prevent their ravages. In order to insure success, the tarring should be commenced in season, and well and properly applied; and though it may fail to completely extirpate them, it will so keep them in check that they will cause but little, if any mischief. The preparation for tarring the trees, should be made soon after the frosts occur in the latter part of October, by encircling them with strips of tarred paper, eight or ten inches wide. These should be confined to the trunks of the trees by strings made from rope yarns, or old bale ropes untwisted, and one of these should be tied near the lower edge of the paper, to carry the drip of tar from the tree, should there be any, which will not usually be the case, if the tar is put on the upper edge of the paper, as it always should be, and the paper is of a suitable width. In purchasing the tar, it is best to select the thinnest, and it is much cheaper to obtain it by the barrel than in smaller quantities, as it keeps well, and neighbors can unite in the purchase. The tar can be applied with a common paint brush, but one with a longer handle, called a varnish brush, is more cleanly, and is better. All these materials can usually be found in a ship chandler's store. It may be necessary to thin the tar with oil, but by this process we, in a measure, destroy its viscousness. Should it be desirable to make the tar thin by warming it over a fire, we may use for the purpose an old heavy dinner pot, it being the best for that purpose, as it longer retains the heat.

In regard to the frequency of tarring, my practice has been to tar every other night, when I observed the grubs were running, and omit to do it on those cold and stormy nights when I

noticed they were quiet. The tarring should be continued in the autumn and spring, until the grubs are no longer seen. The strips of paper should then be immediately taken from the trees, and if there be any tar on their trunks it should be carefully scraped off. Some persons are in the habit of applying the tar directly to the trunk of the tree. This can be done without much apparent injury to an old tree having a rough bark, and providing the tar is all scraped from it early in the spring, or before the heat of the sun has caused it to run down and drip. We would not, however, recommend the direct application of tar upon the bark, it not being entirely safe, and when we take into view the trouble of scraping it from the tree, it is not a saving of labor. As a general rule, our greatest efforts should be directed in preventing the grub from ascending the trunk of the tree, but something may be done after it has eluded us, and effected its object. If the trees are small and easily reached, by jarring the branches the worms can be made to spin down by their threads, and by severing these with a stick, they will fall to the ground. If this be done when they are small, they will not recover the tree again. In the winter season, upon the hard crust of a deep snow, when a great reflection of light is produced, many clusters of the eggs of the canker worm, Lackey caterpillar, and other insects, can readily be discovered and destroyed.

During a period of twenty-five years, my grounds have been thrice visited by canker worms, and in each instance I have succeeded in preventing their ravages, by tarring the trees, very much in the way and manner narrated in this essay.

The American tent caterpillar, or Lackey, usually known by the name of the caterpillar, is an insect injurious to the apple tree, and is more generally known than the canker worm. It is a native insect, and probably before the settlement of the country, subsisted upon the foliage of the wild cherry tree. Its habits being entirely different from the canker worm, renders it more under our control, and easily destroyed. This arises from its being gregarious, and forming in large numbers a common web, in the fork of the tree, where they can be found early in the morning, at noon, and in the evening. These habits of the caterpillar it is well to remember when we would make a call at their domiciles. The methods laid down by some of the old

writers upon the culture of fruit trees to destroy the Lackeys, were to wait until their nests were of a sufficient size, and then fire a charge of gunpowder into them, or apply a match of burning brimstone on the end of a pole. These appliances to the vermin were certainly sufficiently sanguinary, and discovered a good degree of earnestness in the attack; but at the present day we would not recommend its practice. Neither would we apply spirits of turpentine, fish oil, soapsuds, or lime water, to their nests, as is the practice of some persons. The best and most effective method of destroying the Lackey caterpillar, is the one recommended by the late Col. Timothy Pickering, in a letter to the Massachusetts Agricultural Society, under date of May 26, 1817,—written when that distinguished gentleman and agriculturist was residing in Wenham, in this county. He says: "I always considered it disgraceful to a farmer to suffer his trees to be stripped of their leaves and their fruit, for that season at least, to be destroyed, seeing it was very practicable to get rid of them, when small, with the fingers. This was my father's mode when I was a boy. The same long ladders, which served in autumn in gathering his winter fruit by hand, enabled one to come at most of the caterpillars' nests in spring. On this effectual example I have myself practiced since I became a farmer. Some over-delicate persons might object to this mode; but it is really far less offensive than the bare sight of large and numerous nests, with which apple trees are sometimes filled. And if this operation be performed early, when the caterpillars are only from a quarter to half an inch long, the operator, (man or boy,) will feel no repugnance. Last Saturday morning, the idea of a proper kind of brush occurred to me, that would be effectual in destroying the caterpillars, and in the forenoon I tried it with complete success. The efficient and convenient instrument for this work, is nothing more than a common bottle brush, fastened on the end of a pole. Having an old one in my house, I was enabled to make the experiment on the day when the idea of so applying it occurred to me. In using the brush, I press it on the small nest, and turning the pole in my hand, the web is entangled in the bristles and removed; otherwise, you rub the fork of the limb, inside and outside, with the brush, when nest and worms are surely killed or brought down." The Pickering brush can now be obtained at all our agricultural

establishments and seed stores. My friend, Hon. Simon Brown, informs me that he makes use of an old hand or dust brush, with good success in destroying caterpillars. Should there be any objection to one's using his bare hand, in crushing the Lackeys when small, as recommended by Col. Pickering, he can use a woollen mitten to cover his fingers. It is important to their complete destruction, that their nests should be broken up when they are small, for when suffered to become large the brush fails to bring them down entire, and the caterpillars are only disturbed, and drop and scatter themselves upon the tree. When *taken in hand* seasonably, and with proper and skilful application of the brush, several times repeated if need be, they may be destroyed without explosion of gunpowder, or the fumes of burning brimstone.

The fall caterpillars, or web worms, that are conspicuous in our orchards in the latter part of summer, are produced from the eggs of a moth, named by the late Dr. T. W. Harris, (*Hyphantria textor*,) or the weaver. The worms, when first hatched, are confined to a single leaf, and can then easily be picked off and crushed under foot. If they are suffered to remain on the trees until their webs appear, they can be destroyed by stripping the leaves inclosed with their nest, and containing the worms, at one grasp of the hand. The Pickering brush can also be used with some success.

The Palmer worm, an insect resembling the canker worm, a few years since appeared suddenly, in many of our orchards in Essex county, and caused some apprehensions among the cultivators of fruit, for fear it might continue to increase, and become troublesome; but nothing was seen of them the following year. I think we have but little to apprehend from them, as their ravages are usually confined to one season. The account given of this insect by Dr. Deane in the year 1791, is as follows:—

"The Palmer worm, or wanderer, as its name implies, is a small worm, about half an inch in length, with many legs, and extremely nimble. It appears at different times, in different parts of the country."

I have seen them only on apple trees and oak trees, in any great abundance. They give trees the same appearance, that the canker worm does. They appeared in the county of Cum-

berland, in 1791, about the middle of June, and in the following year there was none to be seen; and I have not known them in any place two years in succession.

The apple tree borer, (*Saperda bivittata*,) of Say, has become notorious in many parts of the Commonwealth for its ravages. It is a native insect, and appears to have been brought into public notice by John Prince, Esq., of Jamaica Plains, in July, 1819. The insect, in a perfect state, is a beetle, which comes forth from the trunk of the tree in the night, in the month of June. It deposits it eggs upon the bark near the ground during the months of June, July, or August. These, when hatched, produce a larva, which eats through the bark, and remains the first winter; and on the following spring it works its way into the wood, when its presence is first noticed by its borings proceeding from the tree.

During the season it continues to make its way up the trunk, some six or eight inches. It remains in the tree from two to three years, when the grub is transformed into a pupa. After it becomes a beetle, it gnaws through the bark, in the night, and makes its escape from the tree. There are two ways of dealing with the borer; one is, to remove all the rubbish and grass from around the tree—keep its bark smooth, and wash it occasionally with a lye of wood ashes, or a solution of a pound of potash to two gallons of water. As the use of potash water is liable to injure young trees, some persons recommend a wash made by mixing in two gallons of water, two quarts of whale oil soap and one-fourth of a pound of sulphur, adding a sufficient quantity of clay to make it of the consistency of thick paint, and applying it to the trunk of the tree with a brush. This is to be done to prevent the borer from attacking the tree, and to destroy its eggs when deposited in the bark. Should these preventive measures fail, and the borer succeed in laying its eggs, and the grub effect its entrance into the tree, our second method should be to endeavor to destroy it, by cutting it out with a gouge, or by a wire thrust into the holes it has made. The use of the wire in killing the grub is pronounced by Dr. Harris, as the oldest, safest, and most successful method.

The plant-louse, or *Aphis*, sometimes appears in such numbers on the terminal branches or twigs of young apple trees, as greatly to retard their growth, and render them unhealthy.

These lice are easily destroyed by the application of suds, made from whale oil soap. The downy plant louse, called improperly in England, the American blight, from the erroneous supposition that the insect came from this country and spread itself over Europe, we have occasionally seen in the orchards of Essex county; but they have never increased in such numbers, as to produce the mischief they have in England, and do not merit particular attention. Should they, however, in future become troublesome, they can be destroyed by removing all the old rugged bark, and scrubbing the trunk and branches with a hard brush. English authors recommend many ways to destroy the downy plant louse, such as the application of spirits of tar, spirits of turpentine, oil or soap. I would here notice, that I have seen this insect in my own grounds for several seasons, under the clay used in grafting, eager in collecting the sap exuding from the wounded stump. I have also seen it on English beeches, walnuts and thorns.

The Bark louse can be destroyed by the application of a wash of the consistency of paint, composed of lime, clay and cow-dung, applied with a white-wash brush to the bark of the tree.

Among the insects annoying to the cultivators of fruit, we may mention the curculio and codling-moth, otherwise called the apple worm. These pests have greatly increased in our orchards within a few years, and have become so numerous, that great exertions should be made by all cultivators to destroy them.

The curculio is a native insect, and has long been known in this country. That distinguished early naturalist, John Bartram, in a letter to his friend, Peter Collinson, of London, under date of April 16, 1746, says: "All our stone fruit is bit with the insect; but the peaches, and some kind of cherries overgrow them." Collinson, in reply to Bartram, says: "Now friend John, to prevent the depredations of the beetle, I confess is not so easy as some other bad effects. Suppose as soon as this beetle is discovered, the trees are smoked with burning straw under them, or the trees were squirted on by a hand engine with water, in which tobacco leaves were soaked; either of these two methods, I should think, if they did not totally prevent, yet, at least, would secure so much of these fine fruits, as would be worth the labor of people of circumstances, who are curious to taste these delicious fruits in perfection." But notwithstanding the

advice here given by the amiable and long distinguished London naturalist and antiquary, and besides numerous other preventives, that have been recommended, during a period of more than one hundred years, the curculio continues to increase, and its depredations are more extended at this time than at any former period. It is now known to attack the pear, apple, cherry, plum, apricot, peach, and even the gooseberry, as we have noticed the past season. And should these fruits fail in a barren year to present themselves to the curculios, as receptacles, in which to deposit their eggs, they would no doubt make use of the terminal branches of the plum, or some other tree for that purpose, like the copper colored weevil or curculio of Europe, mentioned by Kollör in his treatise. The present year, plums being scarce, I have noticed that the plum trees infested with black warts, have been visited by the curculio, and these excrescences have been very generally used as depositories for its eggs. For many years the mischief caused by the insect under consideration, was supposed to be principally confined to the plum and other stone fruit. But we have of late discovered the crescent mark of the beetle upon our apples, that drop early in the season. By some persons the premature dropping of the fruit has been attributed principally to dry westerly winds; but we apprehend the chief cause of its falling thus early, is its being punctured by the curculio. The best method of destroying this insect, is frequently to pick up the fallen fruit.

In noticing the apple worm or codling-moth, it may not be necessary to give a scientific description, as this knowledge would not particularly aid us in its destruction. Unlike the curculio, it is not a native insect, but was introduced from Europe, and has become completely naturalized in this country. Its ravages are not now confined to our cultivated fruits, but it has commenced its attack upon those that are indigenous. A few years since we had a fine bed of cranberries nearly destroyed by them. At that time being ignorant of their true character, we sent the grub for examination to our late esteemed friend, Dr. T. W. Harris, who pronounced it the apple worm. We have seen these worms since upon cranberries growing on upland, when they were not overflowed by water. The apple worm can be destroyed, or its numbers greatly reduced by picking up the

wormy fruit. The oftener this is done the better, as it gives less time for the worm to escape from the apple.

In a season like the present, when apples are scarce, a large portion of them will be found to be wormy, and many of them will drop; it will be found a favorable time to get rid of the worms, as we shall have comparatively but little ground to go over to gather up the fallen fruit. As some of the grubs leave the fruit before it falls, to seek a shelter to pass into the chrysalis state, it has been discovered beneficial to place old woollen cloths in the crotches of the trees, or wind them around the branches, wherein they may creep, and where they can be destroyed. The cheap, soft ropes that are used to bind hides, are found when bound around trees to answer a good purpose. They should be unwound from the trees in autumn, and the pupes destroyed. As the practice of grinding the wind-falls to be made into cider appears to be again coming into favor, it will certainly lessen the ravages of the apple worm, by crushing both the apple and the grub together. And although the revival of this old practice of cider making, from wormy and rotten wind-falls, will not probably promote the cause of temperance, yet it is some satisfaction to know that it kills apple worms, and who can say they are not thus made subservient to a useful purpose, by imparting a flavor to the cider?

METEOROLGICAL OBSERVATIONS

MADE BY JOHN BROOKS, PRINCETON, MASS., AT 7, 2 AND 9 O'CLOCK OF EACH DAY OF THE YEAR,

1856.

METEOROLOGICAL OBSERVATIONS—1856.

JANUARY.

Day of Month.	THERMOMETER.			CLOUDS. Extent, course, and velocity. 10=wholly covered. 1=2 miles an hour, 2=4, etc.			WIND. Direction and force. 1=2 miles an hour, 4=25 miles an hour.			RAIN AND MELTED SNOW.			
	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Hour began.	Hour ended.	Am't of rain and melted snow in inches and hund'ths.	Am't of snow in inches.
1	13	23	18	1 W.1	1 W.1	– –	W.1	W.1	W.1	– –	– –	– –	– –
2	11	20	21.5	1 –	10 –	10 –	N. E.1	E.1	E.2	10 P. M.	– –	– –	– –
3	26	29	27	10 –	10 –	– –	do.2	do.2	N. W.2	– –	3 A. M.	0.63	5 inches.
4	10	18.5	2	– –	– –	– –	W.1	W.2	W.1	– –	– –	– –	– –
5	3	5	4	10 –	10 –	10 –	E.2	E.3	N. E.4	3 P. M.	– –	– –	– –
6	10.5	14	14	10 –	1 N. W.1	– –	N. E.3	N. W.2	N. W.1	– –	9 P. M.	0.97	10 inches.
7	9	14.5	15.5	2 N. W.1	10 –	10 –	do.1	N. E.1	N. E.1	– –	– –	– –	– –
8	21	21.5	—2	10 –	8 W.2	– –	N. W.1	W.3	W.3	– –	– –	– –	– –
9	—13	—3.7	—7	– –	– –	6 –	W.1	do.2	do.2	– –	– –	– –	– –
10	—6	13	14	1 –	– –	– –	do.4	do.4	do.3	– –	– –	– –	– –
11	10	22.5	14.5	– –	– –	– –	do.2	do.2	do.1	– –	– –	– –	– –
12	12	19.5	14.5	2 –	10 –	10 –	N.1	E.1	E.2	11 P. M.	– –	– –	– –
13	17	25.5	25	10 –	10 –	10 –	N. E.4	N. E.3	N. E.2	– –	10 P. M.	1.50	15 inches.
14	23	21	16	10 –	10 –	10 –	do.1	N. W.1	do.2	– –	– –	– –	– –
15	14	21	16.5	3 N. W.2	4 W.1	– –	N. W.2	W.1	W.2	– –	– –	– –	– –
16	13	22	20	– –	3 do.1	10 –	W.2	do.1	N. E.1	– –	– –	– –	– –
17	20	27	26	10 –	8 do.2	10 –	do.1	do.2	W.1	– –	– –	– –	– –
18	23	30	22.5	2 W.1	1 –	2 –	do.1	do.1	do.1	– –	– –	– –	– –
19	23.3	20	3.5	9 W.1	6 N. W.1	2 N. W.1	do.1	N. W.1	N. W.2	– –	– –	– –	– –
20	7	19	14.5	4 N. W.1	10 N. E.1	2 N.1	N. W.1	N. E.1	N.1	– –	– –	– –	– –
21	5	11.5	8.5	3 N. W.1	5 N. W.2	10 –	do.1	N. W.2	N. W.3	– –	– –	– –	– –
22	3	15	11	1 –	1 –	1 –	do.3	do.2	do.1	– –	– –	– –	– –
23	9	25	18.5	1 –	– –	– –	W.1	W.1	W.2	– –	– –	– –	– –
24	13	24	22	3 W.1	– W.1	3 W.2	do.2	do.1	do.3	– –	– –	– –	– –
25	—1	0	—0.5	– –	– –	– –	N. W.3	do.4	do.3	– –	– –	– –	– –
26	—1	18.5	14	– –	– –	– –	do.3	N. W.3	N. W.3	– –	– –	– –	– –
27	5	19	21	5 W.1	10 W.1	10 –	W.1	W.2	S. E.	– –	– –	– –	– –
28	16	15	12	10 –	10 –	10 –	N. E.3	N. E.3	N. E.2	1 A. M.	6 P. M.	0.25	2 inches.
29	15	27.5	22	10 W.2	10 W.1	10 W.1	W. –	W.1	W.1	– –	– –	– –	– –
30	21	21	11	10 –	4 do.2	– –	do.1	do.4	do.1	– –	– –	– –	– –
31	10.5	15	9	– –	4 do.1	5 –	do.2	do.1	do.1				
											Total,	3.35	32 inches.

METEOROLOGICAL OBSERVATIONS—1856.

FEBRUARY.

Day of Month.	THERMOMETER.			CLOUDS. Extent, course, and velocity. 10=wholly covered. 1=2 miles an hour, 2=4, etc.			WIND. Direction and force. 1=2 miles an hour, 2=4 miles an hour.			RAIN AND MELTED SNOW.			
	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Hour began.	Hour ended.	Am't of rain and melted snow in inches and hund'ths.	Am't of snow in inches.
1	10	17	17	10 S. E.[1]	10 S. E.[1]	10 S. E.[1]	S. E.[1]	S. E.[1]	S. E.[1]	5 A. M.	9 P. M.	.01	½ inch.
2	15	15	3	10 N. W.[1]	5 N. W.[2]	– –	N. E.[1]	N. W.[1]	N. E.[2]	in night.	7 A. M.	.02	1 inch.
3	—4	5.5	3	1 –	5 –	– –	N. W.[3]	do.[3]	do.[3]	– –	– –	– –	– –
4	1	13	5	1 N. W.[1]	2 N. W.[2]	– –	do.[3]	do.[2]	N. W 1	– –	– –	– –	– –
5	5	14	9	7 do.[1]	2 do.[2]	– –	do.[2]	do.[3]	do.[3]	– –	– –	– –	– –
6	5	16.5	11	– –	– –	3 –	do.[2]	W.[1]	W.[1]	– –	– –	– –	– –
7	15	25	30.5	10 –	10 –	10 –	S. W.[1]	S. W.[1]	do.[1]	6 A. M.	6 P. M.	.02	1 inch.
8	22.5	24	19	5 W.[1]	6 W.[1]	1 –	W.[1]	W.[1]	N. W.[1]	– –	– –	– –	– –
9	15	20	9	10 N. E.[1]	9 do.[1]	– –	N. E.[1]	N. W.[2]	do.[1]	– –	– –	– –	– –
10	6	17	16	5 W.[1]	3 do.[1]	9 S. W.[1]	W.[1]	W.[1]	S. W.[1]	– –	– –	– –	– –
11	22	37	33	9 S. W.[1]	– –	10 –	S. W.[1]	do.[1]	do.[1]	– –	– –	– –	– –
12	35.7	26.7	—1.5	10 W.[1]	10 W.[1]	– –	W.[3]	do.[1]	W.[3]	10 P. M.	– –	– –	– –
13	—7	7.5	—6	8 do.[1]	– –	8 W.[1]	do.[1]	do.[1]	do.[1]	– –	6 A. M.	.60	– –
14	—8	6.5	1	– –	– –	– –	do.[1]	do.[1]	do.[1]	– –	– –	– –	– –
15	5	18	18	10 –	10 W.[1]	10 –	do.[1]	do.[1]	S. W.[1]	9 P. M.	– –	– –	– –
16	22.5	30	26	10 –	– –	10 –	E.[1]	do.[1]	do.[1]	– –	1 A. M.	.04	1½ inch.
17	23	14	7	9 W.[1]	10 N. W.[1]	5 N. W.[3]	W.[1]	N. W.[3]	N. W.[4]	– –	– –	– –	– –
18	3	7.5	5.5	– –	7 do.[3]	8 do.[2]	N. W.[3]	do.[4]	do.[3]	– –	– –	– –	– –
19	7	18	11	5 N. W.[3]	1 –	2 –	do.[1]	do.[2]	S. W.[2]	– –	– –	– –	– –
20	15	24	24	9 W.[1]	5 W.[1]	9 W.[2]	W.[1]	W.[1]	W[2].	– –	– –	– –	– –
21	29	32	25	9 do.[2]	6 do.[2]	– –	do.[1]	do.[2]	do.[1]	– –	– –	– –	– –
22	19.5	32.5	29	– –	– –	5 W.[1]	do.[1]	do.[2]	do.[1]	– –	– –	– –	– –
23	31	37	29.2	5 W.[1]	9 S.[1]	10 –	N. W.	S.[1]	N. W.[1]	– –	– –	– –	– –
24	24	24	17	4 N. W.[2]	4 N. W.[2]	1 –	do.[1]	N. W.[1]	W.[1]	– –	– –	– –	– –
25	14	24	18.5	2 do.[1]	5 do.[2]	– –	do.[1]	do.[2]	do.[1]	– –	– –	– –	– –
26	13	26	18.5	– –	– –	– –	W.[1]	do.[1]	do.[1]	– –	– –	– –	– –
27	12	27.3	25	– –	10 –	10 –	do.[1]	do.[1]	N. E.[1]	– –	– –	– –	– –
28	15.5	26	20.5	– –	8 W.[1]	– –	N. W.[1]	do.[1]	W.[1]	– –	– –	– –	– –
29	18.5	26	21.5	10 N. W.[1]	8 do.[1]	10 –	do.[1]	W.[1]	do.[1]	– –	– –	– –	– –
											Total, . . .	0.69	4 inches.

METEOROLOGICAL OBSERVATIONS—1856.

MARCH.

Day of Month.	THERMOMETER.			CLOUDS. Extent, course, and velocity. 10=wholly covered. 1=2 miles an hour, 2=4, etc.			WIND. Direction and force. 1=2 miles an hour, 2=4 miles an hour.			RAIN AND MELTED SNOW.			
	7 A. M.	2 P. M.	9 P. M.	7 A. M.	7 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Hour began.	Hour ended.	Am't of rain and melted snow in inches and hund'ths.	Am't of snow in inches.
1	20	32	23.5	5 W.1	6 W.2	10 –	W.1	W.1	S. W.1	11 P. M.	– –	– –	– –
2	25.5	32.7	23.5	10 –	10 do.1	– –	N. E.3	do.1	N. W.4	– –	2 P. M.	0.70	6 inches.
3	19	21	17	5 N. W.3	4 N. W.4	– –	N. W.3	N. W.4	do.2	– –	– –	– –	– –
4	13	27	24	1 –	6 W.2	10 –	W.1	W.3	do.2	– –	– –	– –	– –
5	16	20	14.5	1 –	8 do.1	– –	N. W.3	do.1	W.1	– –	– –	– –	– –
6	19.5	34	12	10 –	3 do.1	– –	W.1	do.2	do.1	5 A. M.	6 P. M.	.30	3 inches.
7	11.5	17	13	– –	– –	– –	do.1	do.1	do.1	– –	– –	– –	– –
8	20.5	25	7	5 W.1	1 –	– –	do.1	do.2	N. W.4	– –	– –	– –	– –
9	—4	6	2	– –	3 N. W.2	1 –	N. W.2	N. W.2	do.1	– –	– –	– –	– –
10	—6	3	0	3 N. W.2	– –	– –	do.1	W.2	do.2	– –	– –	– –	– –
11	1.5	16	14	1 –	6 N. W.1	3 W.2	W.1	N. W.1	W.2	– –	– –	– –	– –
12	6.5	13.5	10.7	– –	4 W.2	– –	do.1	W.2	do.1	– –	– –	– –	– –
13	11	24.3	23.5	– –	– –	– –	do.1	do.2	N. W.1	– –	– –	– –	– –
14	20	32.5	25.5	3 N. W.1	3 W.1	– –	N. W.1	do.1	W.1	– –	– –	– –	– –
15	22	32	24	10 W.1	6 do.2	– –	W.1	do.2	do.1	– –	– –	– –	– –
16	21	31	24	6 do.1	5 do.1	1 W.1	do.2	do.1	do.1	– –	– –	– –	– –
17	22	32	26	3 N. W.2	8 do.1	1 do.1	N. W.1	do.1	do.1	– –	– –	– –	– –
18	19	34.5	26	1 W.1	– –	– –	W.1	do.1	do.1	– –	– –	– –	– –
19	26	30.7	26	10 –	10 –	10 –	E.1	E.1	E.1	1 P. M.	7 P. M.	.31	3 inches.
20	23.5	35	30	10 –	8 W.2	4 W.1	W.1	W.1	W.1	– –	– –	– –	– –
21	31.5	38	31	10 S. W.1	10 –	10 N. E.1	S. W.1	E.1	N. E.1	– –	– –	– –	– –
22	35	35.5	29	3 N. E.1	2 N. E.1	9 do.3	N. E.1	N. E.1	do.2	– –	– –	– –	– –
23	28.5	37	30	9 do.2	5 do.1	6 N.1	do.2	do.1	N.1	– –	– –	– –	– –
24	27.5	40	31	2 W.1	9 S. E.1	10 S. E.1	W.1	S. E.1	S. E.1	– –	– –	– –	– –
25	28	38.5	28.5	9 E.3	7 W.1	– –	E.2	W.1	N. W.1	– –	– –	– –	– –
26	27	35	28.5	1 N. W.1	3 N. W.3	– –	N. W.1	N. W.3	do.2	– –	– –	– –	– –
27	27.5	32	23	1 do.3	2 do.2	– –	do.3	do.2	do.3	– –	– –	– –	– –
28	14	17.5	15	5 do.1	6 do.2	10 –	do.1	do.2	do.2	– –	– –	– –	– –
29	14.5	25	21	3 do.2	10 W.2	9 W.2	do.2	W.2	W.2	– –	– –	– –	– –
30	19	29	19.5	3 W.1	– –	– –	W.2	do.2	N. W.1	– –	– –	– –	– –
31	1	27	23	– –	1 –	– –	N. W.2	N. E.1	N.2	– –	– –	– –	– –
											Total, . . .	1.31	12 inches

APRIL.

Day of Month.	THERMOMETER.			CLOUDS. Extent, course, and velocity. 10=wholly covered. 1=2 miles an hour, 2=4, etc.			WIND. Direction and force. 1=2 miles an hour, 2=4 miles an hour.			RAIN AND MELTED SNOW.			
	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Hour began.	Hour ended.	Am't of rain and melted snow in inches and hund'ths.	Am't of snow in inches.
1	24	34	25	– –	– –	– –	N.1	W.1	W 1	– –	– –	– –	– –
2	25.5	41	33.7	– –	6 W.1	10 –	W.1	do.1	S.1	11 P. M.	– –	0.16	– –
3	41	43.7	39	10 –	10 –	10 –	S.1	S.1	do.1	– –	– –	– –	– –
4	38.5	39	39.5	10 –	10 –	10 –	W.1	E.1	N. W.1	– –	– –	– –	– –
5	35.5	42	33.5	6 W.1	4 W.1	1 W.1	do.1	W.2	W.1	– –	– –	– –	– –
6	38.5	44	39	3 N. E.1	1 N. E.1	– –	N. E.1	N. E.1	N.1	– –	– –	– –	– –
7	36	50	41	1 –	5 W.1	– –	N.1	W.1	W.1	– –	– –	– –	– –
8	39.5	53	45	– –	– –	– –	N. W.1	do.1	do.1	– –	– –	– –	– –
9	45	60.7	48	– –	– –	10 S.1	W.1	do.1	S.2	– –	– –	– –	– –
10	42	46 5	34.5	– –	– –	– –	do.2	N. W.1	N. W.2	– –	– –	– –	– –
11	31	46.5	37.5	2 N. W.1	5 W.1	3 W.2	N. W.1	W.2	S. W.2	– –	– –	– –	– –
12	41	54.5	41	5 S. W.1	10 S. W.2	10 N. E.3	S. W.2	S. W.2	N. E.3	6 P. M.	10 P. M.	.42	– –
13	24	25	30	4 W.2	– –	– –	N.1	N. W.2	N. W.1	– –	– –	– –	– –
14	26	41.5	38.5	9 do.1	10 –	6 W.2	W.1	S. W.1	W.1	– –	– –	– –	– –
15	46.5	51.7	45	6 do.1	8 W.1	10 N. E.1	N. E.1	N. E.1	N. E.1	– –	– –	– –	– –
16	39	42	35	10 –	10 E.1	10 –	E.1	E.1	W.1	– –	– –	– –	– –
17	39	61	47	10 W.1	8 W.1	10 N. E.2	W.1	S W.1	N. E.2	2½ P. M.	8 P. M.	.44	– –
18	44	54.5	44	– –	10 do.1	1 –	N. W.1	W.1	N. W.1	3 P. M.	shower.	.01	– –
19	44.5	56.5	51	1 N. W.1	8 do.1	9 W.1	N. E.1	do.1	W.1	– –	– –	– –	– –
20	41.5	36.5	34	10 N. E.2	10 N. E.3	10 N. E.4	do.2	N. E.3	N. E.4	3 P. M.	– –	– –	– –
21	34	33	34	10 do.4	10 do.4	10 do.3	do.4	do.4	do.3	– –	11 P. M.	1.51	– –
22	36	42	37.5	9 S. W.3	10 S. E.3	10 S. W.3	S. E.1	S. E.1	S. W.2	12 M.	5 P. M.	.18	– –
23	42	62	50	1 –	4 W.2	10 do.1	W.1	W.2	do 1	– –	– –	– –	– –
24	50.5	55.5	50	10 E.1	10 E.2	10 E.2	E.1	E.1	E.1	– –	– –	– –	– –
25	46	58	43	10 N. E.1	5 do.2	– –	N. E 1	do.2	N. E.1	– –	– –	– –	– –
26	42	55	42	– –	– –	2 –	do 1	S. E.1	S.1	– –	– –	– –	– –
27	44	65	56	– –	1 –	2 –	W.2	S. W.2	S. W.3	– –	– –	– –	– –
28	52	68	41	7 W.2	8 S. E.1	10 –	do.1	S. E.1	N. E.1	– –	– –	– –	– –
29	39	67.7	46	4 N. E.3	4 W.1	1 –	N. E.2	W.1	S. E.1	– –	– –	– –	– –
30	54	56	39.5	6 do.1	10 E.1	10 –	do.1	E.1	E.1	– –	– –	– –	– –
											Total, . . .	2.72	

METEOROLOGICAL OBSERVATIONS—1856.

MAY.

Day of Month.	THERMOMETER.			CLOUDS. Extent, course, and velocity. 10=wholly covered. 1=2 miles an hour, 2=4, etc.			WIND. Direction and force. 1=2 miles an hour, 2=4 miles an hour.			RAIN AND MELTED SNOW.			
	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Hour began.	Hour ended.	Am't of rain and melted snow in inches and hund'ths.	Am't of snow in inches.
1	42	58	43.5	10 N. E.	5 W.1	10 –	N. E.1	W.1	N. W.1	– –	– –	– –	– –
2	42	43.5	36.5	10 –	10 –	10 –	E.1	E.1	E.2	4 A. M.	– –	– –	– –
3	33.5	37	36	10 –	10 –	10 –	do.1	do.1	S. W.1	– –	3 P. M.	0.75	– –
4	43	46.5	35	– –	9 N. W.1	5 N. W.1	N.1	N.2	N. W.1	– –	– –	– –	– –
5	34.3	43.5	43 5	7 N.3	5 N. E.2	3 N.2	N. W.2	N. E.1	N.2	– –	shower.	.03	– –
6	40	57.5	50	1 –	6 W.1	1 –	do.2	N. W.1	do.1	– –	– –	– –	– –
7	47	57	41	3 N. W.2	7 E.2	3 –	N. E.2	E.2	E.1	– –	– –	– –	– –
8	40	41.5	38	10 –	10 S. E.3	10 N. E.3	do.1	S. E.2	N. E.3	12 M.	– –	– –	– –
9	37	34	34	10 N. E.4	10 N. E.4	10 do.3	do.4	N. E.4	do.3	– –	snow in	afternoon.	2 inches.
10	38	41	38	10 do.3	10 do.3	10 do.3	do.3	do.3	do.3	– –	7 A. M.	2.04	– –
11	40	45.5	41	10 do.2	10 do.1	10 do.	do.2	do.1	S.1	– –	12 M.	.73	– –
12	51	71	60	– –	4 W.2	3 W.2	N. W.2	W.2	W.2	– –	– –	– –	– –
13	44	55	45	9 W.2	9 do.2	8 N. W.2	N. E.1	N. W.1	N. E.1	– –	– –	– –	– –
14	46.5	62.7	47	8 do.2	– –	8 S. W.3	S. W.1	S.1	S. W.2	– –	– –	– –	– –
15	50	71	57	3 do.1	6 S. W.1	2 –	W.1	do.3	S.2	– –	– –	– –	– –
16	57	59.5	56	8 S. W.2	10 W.2	8 W.2	S. W.2	W.1	W.1	10 A. M.	– –	.15	– –
17	54.7	60	56	10 W.1	10 S. W.1	10 S. W.1	W.1	S. W.1	S. W.1	– –	– –	.05	– –
18	53	68.5	55	9 S. W.1	5 S.1	5 W.1	S. W.1	S.1	E.1	– –	– –	– –	– –
19	49 5	71	57	10 E.1	6 W.1	10 S. W.1	E.	W.1	S. W.1	6 P. M.	11 P. M.	.37	– –
20	56	71.2	52	8 W.1	8 do.2	3 –	W.1	do.2	W.1	– –	– –	– –	– –
21	46.7	57	51 5	– –	– –	– –	do.1	do.1	N. W.2	– –	– –	– –	– –
22	47.7	63.5	54	– –	3 W.1	1 –	do.1	N. W.2	S. W.1	– –	– –	– –	– –
23	56.5	75.7	67.5	5 W.1	– –	3 –	do.1	W.1	W.1	– –	– –	– –	– –
24	64.5	84	62	4 do.1	8 W.1	10 N. W.1	do.1	do.2	N. W.1	4½ P. M.	5 P. M.	.60	– –
25	45	49	37	1 N. W.1	8 N. W.2	3 do.1	N. W.2	N. W.3	do.2	9 P. M.	3 A. M.	.24	– –
26	43	48	44	10 do.2	9 N. E.2	1 –	do.2	N. E.2	do.1	– –	– –	– –	– –
27	48.5	67	54	3 W.1	6 S. W.2	3 S. W.1	W.1	W.1	S. W.2	– –	– –	– –	– –
28	52	64	52	10 S. W.3	10 W.2	– –	S. W.3	do.1	W.1	6½ A. M.	10 A. M.	.60	– –
29	50	54	54.5	4 W.1	5 W.1	10 S. W.1	W.1	do.1	S. W.2	– –	– –	– –	– –
30	40	46	39	1 N. W.3	8 N. W.2	8 W.2	N. W.3	N W.2	W.2	– –	– –	– –	– –
31	40	46	40	4 W.3	6 W.2	– –	W.2	W.3	S. W.1	– –	– –	– –	– –
											Total, . . .	5.56	2 inches.

METEOROLOGICAL OBSERVATIONS—1856.

JUNE.

Day of Month.	THERMOMETER.			CLOUDS. Extent, course, and velocity. 10=wholly covered. 1=2 miles an hour, 2=4, etc.			WIND. Direction and force. 1=2 miles an hour, 2=4 miles an hour.			RAIN AND MELTED SNOW.			
										Hour began.	Hour ended.	Am't of rain and melted snow in inches and hund'ths.	A'mt of snow in inches.
	7 A.M.	2 P.M.	9 P.M.	7 A.M.	2 P.M.	9 P.M.	7 A.M.	2 P.M.	9 P.M.				
1	44	65	53	3 W.2	5 S. W.2	5 S. W.2	W.1	S. W.2	S. W.2	– –	– –	– –	– –
2	53	73	61	1 N. W.1	7 W.1	1 –	N. W.1	W.1	W.1	– –	– –	– –	– –
3	60.5	76	66	9 W.2	5 N. W.2	9 N. E.2	do.2	do.2	N. E.2	– –	– –	– –	– –
4	61	73.5	65	7 N. E.	8 W.1	10 do.1	N. E.1	do.1	do.1	– –	– –	– –	– –
5	49.5	55	48	10 E.2	10 E.2	10 –	E.2	E.1	S.2	– –	– –	– –	– –
6	46.5	51	44	9 do.2	9 do.1	10 E.2	do.2	do.2	E.2	– –	– –	– –	– –
7	46	54	54	10 N. E.2	10 N. E.2	10 S. W.1	N. E.2	N. E.2	S. W.1	– –	– –	– –	– –
8	54	60	54	10 W.2	10 S. E.1	10 do.1	W.2	S. E.1	do.1	slight	shower.	0.27	– –
9	56	66.5	58	10 S.1	10 W.2	3 W.1	S.1	W.2	W.1	3 P.M.	– –	.07	– –
10	55	71	63	3 W.2	7 W.1	8 do.2	W.1	do.2	do.2	– –	– –	– –	– –
11	59	78	65	4 N. W.1	3 N. W.1	1 S. W.1	N. W.2	N. W.1	S. W.1	– –	– –	– –	– –
12	64	75.5	60	1 –	5 W.1	10 –	W.1	W.1	W.1	– –	– –	– –	– –
13	58	70	64	10 –	10 E.1	3 S. W.1	E.1	E.1	S. W.1	5 P.M.	– –	.04	– –
14	64.7	75	62	10 W.2	6 W.1	9 do.2	W.1	W.1	do.2	7 P.M.	– –	.11	– –
15	56.5	66	56	4 S. W.2	5 W.2	3 W.1	N. W.2	do.2	W.1	– –	– –	– –	– –
16	55	64	58.5	– –	8 N. W.1	7 W.1	do.1	N. W.1	do.1	– –	– –	– –	– –
17	61.5	71	61.5	2 –	5 N. E.1	2 –	N. E.1	N. E.1	do.1	– –	– –	– –	– –
18	64.5	69.5	56	8 W.1	10 S. W.2	10 S. E.1	W.1	S. W.1	S. E.1	1½ P.M.	in night.	.32	– –
19	56.5	62	57	10 N. E.1	10 N. E.2	10 N.2	N. E.2	N. E.2	N.2	– –	– –	– –	– –
20	57	80	78	1 N. W.2	3 W.1	10 –	N. W.2	W.1	W.2	– –	– –	– –	– –
21	72	82	75	– –	1 –	10 –	do.2	N. W.2	do.1	– –	– –	– –	– –
22	73	82	76	1 –	8 W.1	3 N. W.1	W.2	W.2	N. W.2	– –	– –	– –	– –
23	65	72	60	1 –	2 N.1	1 –	N.2	N. W.1	N. E.1	– –	– –	– –	– –
24	58	71	56.5	1 N. E.1	3 N. E.1	1 –	N. E.1	N. E.1	S. W.1	– –	– –	– –	– –
25	59	67	63	9 S. W.1	3 S. W.3	10 –	S. W.3	S. W.3	do.3	11 A.M.	12 M.	.06	– –
26	68	80.7	72	10 W.2	2 –	3 S. W.1	W.2	W.1	do.1	12½ P.M.	– –	– –	– –
27	69	74	64	2 N. W.1	3 S. W.2	1 –	N. W.1	S. W.2	N.1	– –	1 A.M.	.50	– –
28	62	74	69	3 W.1	2 W.1	1 –	do.1	do.2	S. W.3	– –	– –	– –	– –
29	74	87.5	80	1 –	3 do.4	1 –	W.2	do.3	do.2	– –	– –	– –	– –
30	73	86.5	74	6 W.2	4 S. W.2	1 –	do.2	do.2	N. W.3	– –	– –	– –	– –
											Total, . . .	1.37	

METEOROLOGICAL OBSERVATIONS—1856.

JULY.

Day of Month.	THERMOMETER.			CLOUDS.			WIND.			RAIN AND MELTED SNOW.			Am't of snow in inches.
				Extent, course, and velocity. 10=wholly covered. 1=2 miles an hour, 2=4, etc.			Direction and force. 1=2 miles an hour, 2=4 miles an hour.			Hour began.	Hour ended.	Am't of rain and melted snow in inches and hund'ths.	
	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.				
1	59	71	62	– –	2 N. W.1	1 –	N W.2	N. W.2	N.1	– –	– –	– –	– –
2	56	75.5	65 5	10 S. W.1	– –	– –	do 1	W.1	W.1	– –	– –	– –	– –
3	66	79.5	71	1 –	2 S. W.1	8 S. W.2	W.1	S. W.1	S. W.2	– –	– –	– –	– –
4	64	61.5	60	10 W.1	10 W.1	– –	do.1	N.1	N. W.1	6 A. M.	3 P. M.	0.47	– –
5	62	73	62	1 –	3 W.1	1 –	N.1	W.1	S. W.2	– –	– –	– –	– –
6	61	79	60	4 W.2	5 do.2	– –	W.2	S. W.2	do.1	– –	– –	– –	– –
7	60	70	59	3 do.1	4 do.1	7 W.1	E.1	S. E.1	S E.1	– –	– –	– –	– –
8	55	63	60	10 N. E.1	10 do.1	9 do.1	N. E.1	E.1	N. E.1	– –	– –	– –	– –
9	54	54	54	10 –	10 N. E.3	10 –	do.2	N. E.3	do.2	7½ A. M.	2 P. M.	.35	– –
10	59	73	63	9 N. E.3	5 N. W.2	1 –	do.2	N. W.1	W.1	– –	– –	– –	– –
11	59	79	63	– –	4 S. W.1	2 W.1	W.2	W 1	S. W.1	– –	– –	– –	– –
12	55.5	66.5	65	10 –	10 –	9 S. W.1	E.1	E.1	do.1	2 A. M.	1 P. M.	1.15	– –
13	70	83	70	10 W.1	5 W.2	9 W.2	W.1	W.1	W.2	– –	– –	– –	– –
14	65	82	74	2 –	1 do.1	3 do.1	N. W.1	do.1	do.1	– –	– –	– –	– –
15	71	75	74	9 W.1	3 N. W.3	3 do.1	W.1	N. W.3	N. W.1	11½ A. M.	12 M.	.19	– –
16	60	81	72	3 N. W.2	2 do.2	2 S. W.1	N. W.2	do.1	S. W.1	– –	– –	– –	– –
17	69	87.5	77	4 W.1	1 do.1	1 W.1	W.1	N. W.2	W.1	– –	– –	– –	– –
18	76	89	73	1 –	3 W.2	1 –	N. W.1	S. W.3	N. W.1	– –	– –	– –	– –
19	64	70	61	2 N. W.2	5 do.1	6 N. W.2	do.2	W.2	do.2	– –	– –	– –	– –
20	60	69	60	3 do.2	7 N. W.2	3 do.1	do.2	N. W.2	do.1	– –	– –	– –	– –
21	56	72	63	7 do.1	4 do.1	6 do.1	do.1	do.1	do 1	– –	– –	– –	– –
22	66	79	66	– –	4 W.1	3 W.1	W.1	W.1	S. W.1	– –	– –	– –	– –
23	63	80	69	– –	4 do.1	– –	N. W.1	do.2	N. W.1	– –	– –	– –	– –
24	65	83	74	1 W.1	4 do.1	– –	W.1	do.1	W.1	– –	– –	– –	– –
25	70	87.5	77	3 N. W.1	2 do.1	– –	N. W.1	N. W.1	do.1	– –	– –	– –	– –
26	71	87	78	– –	– –	– –	do.1	do.1	do.1	– –	– –	– –	– –
27	73	89	78	– –	– –	1 W.1	do.1	do.1	do.1	– –	– –	– –	– –
28	73	75	72	4 N. W 1	9 N. W.1	2 N. W.1	do.1	do.1	N. W.1	1½ P. M.	1½ P. M.	.07	– –
29	74	83.5	72	1 N. W.1	8 W.1	W.1	do.1	W 1	W.1	– –	– –	– –	– –
30	67	80	72	10 N. E.1	6 do.1	W.1	N. E.1	E.1	S. E.	– –	– –	– –	– –
31	70	80	71	10 W.1	8 do.1	–	N.1	S. W.1	W.1	– –	– –	– –	– –
											Total . . .	2.23	

METEOROLOGICAL OBSERVATIONS—1856.

AUGUST.

Day of Month.	THERMOMETER.			CLOUDS. Extent, course, and velocity. 10=wholly covered. 1=2 miles an hour, 2=4, etc.			WIND. Direction and force. 1=2 miles an hour, 2=4 miles an hour.			RAIN AND MELTED SNOW.			
	7 A.M.	2 P.M.	9 P.M.	7 A.M.	2 P.M.	9 P.M.	7 A.M.	2 P.M.	9 P.M.	Hour began.	Hour ended.	Am't of rain and melted snow in inches and hund'ths.	Am't of snow in inches.
1	68	82	71	5 W.1	4 S. W.1	– –	W.1	S. E.1	N. E.	– –	– –	– –	– –
2	67	75	68	10 N. E.1	9 E.1	10 –	N. W.1	E.1	E.1	– –	– –	– –	– –
3	66	74	67	10 E.1	9 do.1	10 –	E.1	do.1	S. E.1	– –	– –	– –	– –
4	62.5	70.5	67	10 N. E.1	10 do.1	10 E.1	N. E.1	do.1	E.1	– –	– –	– –	– –
5	65	71	66	10 E.1	10 do.1	10 N. E.1	E.1	do.1	N. E.1	6 P.M.	– –	– –	– –
6	65	78	64	10 N. E.1	7 S. W.1	10 W.1	N. E.1	S. W.1	W.1	– –	in night.	2.42	– –
7	63	70	65	8 W.3	5 W.2	– –	W.2	W.2	do.1	– –	– –	– –	– –
8	67	62	63	10 S. W.1	10 S. E.1	10 S. E.1	S. W.1	S. E.1	S. E.1	10 A.M.	– –	– –	– –
9	62	72.5	63	10 S. E.1	8 S. W.1	8 S. W.1	S. E.1	S. W.1	S. W.1	– –	7 A.M.	1.87	– –
10	63	73	66	1 –	6 N. W.2	5 N. W.1	N. W.2	N. W.2	N. W.1	– –	– –	– –	– –
11	67	77	65	4 S. W.1	8 S. W.2	10 W.1	S. W.1	S. W.2	W.1	– –	– –	– –	– –
12	63	72	64	2 N. W.1	10 W.1	10 do.1	N. W.1	W.1	do.1	– –	– –	– –	– –
13	61.5	70	61	2 W.1	6 do.1	1 do.1	W.1	do.1	do.1	– –	– –	– –	– –
14	62	76	64	2 do.1	4 do.1	3 do.1	do.1	do.1	do.1	– –	– –	– –	– –
15	68	73	59	1 –	5 do.1	4 do.1	N. E.	N.1	do.1	– –	– –	– –	– –
16	57	71	60	1 N. W.1	4 N. W.1	6 N. W.1	N. W.2	N. W.1	N. W.1	– –	– –	– –	– –
17	63	71	58	2 N. E.1	5 E.1	2 N. E.2	N. E.1	E.1	N. E.1	– –	– –	– –	– –
18	57	66	58	10 do.1	4 E.1	10 S. E.1	do.1	E.	S. E.1	– –	– –	– –	– –
19	56	52	58.5	10 S. E.1	10 E.1	10 E.2	S. E.1	E.1	E.2	8 P.M.	– –	– –	– –
20	59	59	55	10 E.3	10 do.3	10 N. E.3	E.3	do.3	N. E.3	– –	– –	– –	– –
21	52	54	54	10 N. E.3	10 N. E.3	10 do.3	N. E.3	N. E.3	do.3	– –	– –	– –	– –
22	58	68	60	8 do.1	6 N. W.1	1 –	do.1	N. W.1	N. W.1	– –	in night.	6.58	– –
23	59	73	62	1 –	5 W.1	10 S. W.1	N. W.1	W.1	S. W.1	– –	– –	– –	– –
24	62	72	64	8 W.2	6 N. W.2	8 N.2	W.1	N. W.2	N.2	– –	in night.	.01	– –
25	58	61	50	1 do.2	6 do.1	3 N. W.1	do.2	do.1	N. W.1	1 P.M.	– –	.02	– –
26	46	60	49	– –	4 do.1	– –	N. W.3	do.1	do.1	– –	– –	– –	– –
27	45	66	55	3 N. W.2	5 W.1	– –	do.2	W.1	W.1	– –	– –	– –	– –
28	58	67	58	1 W.1	8 S. W.2	10 S. W.3	W.1	S. W.2	S. W.3	in night.	– –	– –	– –
29	61	67	58	10 S. W.2	9 do.3	10 do.1	S. W.2	do.2	do 1	– –	in night.	1.49	– –
30	51	63	56	7 N. W.1	6 N. W.1	– –	N. W.1	N. W.1	N. W.1	– –	– –	– –	– –
31	50	64	57	1 –	5 do.2	– –	do.1	do.2	do.1	– –	– –	– –	– –
											Total. .	. . 12.39	

METEOROLOGICAL OBSERVATIONS—1856.

SEPTEMBER.

Day of Month.	THERMOMETER.			CLOUDS. Extent, course, and velocity. 10=wholly covered. [1]=2 miles an hour, [2]=4, etc.			WIND. Direction and force. [1]=2 miles an hour, [2]=4 miles an hour.			RAIN AND MELTED SNOW.			
	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Hour began.	Hour ended.	Am't of rain and melted snow in inches and hund'ths.	A'mt of snow in inches.
1	51	66	57	3 W.[2]	4 W.[2]	5 W.[1]	W.[1]	W.[1]	W.[1]	– –	– –	– –	– –
2	51	64	51	5 W.[1]	3 N. E.[2]	– –	N. E.[2]	N. E.[1]	do.[1]	– –	– –	– –	– –
3	60	71.5	57	1 –	8 W.[1]	– –	W.	W.[1]	do.[1]	– –	– –	– –	– –
4	57	71.7	59.5	– –	– –	– –	do.[1]	do.[1]	do.[1]	– –	– –	– –	– –
5	60.5	75	63	– –	3 W.[1]	2 –	do.[1]	do.[1]	do.[2]	– –	– –	– –	– –
6	57	72	64	7 W.[1]	4 do.[1]	10 S. W.[1]	do.[2]	do [2]	S. W.[1]	– –	– –	– –	– –
7	62	67	57	5 do.[1]	10 E.[3]	10 E.[2]	do.[1]	E.[2]	E.[2]	– –	– –	– –	– –
8	54	64	62	10 E.[1]	10 S. W.[2]	10 W.[1]	E.[1]	S. W.[2]	W.[1]	in night.	8 P. M.	0.35	– –
9	58	74.5	63	3 W.[2]	2 N. W.[2]	– –	N. W.[2]	N. W.[2]	do.[1]	– –	– –	– –	– –
10	61	77	67	3 N.[1]	3 W.[1]	7 W.[1]	do.[2]	S. W.[2]	S. W.[2]	– –	– –	– –	– –
11	67	78	62.5	10 S. W.[3]	5 S. W.[3]	7 do.[1]	S. W.[3]	do [3]	W.[1]	3 P. M.	4 P. M.	.76	– –
12	59	68.7	59	4 W.[1]	6 W.[1]	8 do.[1]	N. W.[1]	W.[1]	S. W.[1]	– –	– –	– –	– –
13	57	71	52	1 –	3 S. W.[2]	– –	S. W.[1]	S. W.[2]	N. W.[1]	3 P. M.	4½ P. M.	.31	– –
14	53	65	59	2 N. W.[3]	1 W.[1]	– –	N. W.[1]	N. W.[1]	do.[1]	– –	– –	– –	– –
15	55	70	59	2 W.[1]	1 –	8 S. W.[1]	W.[1]	S. W.[1]	S. W.[1]	– –	– –	– –	– –
16	53	63	51.5	– –	4 N. W.[1]	– –	N. W.[1]	N. W.[2]	N. W.[2]	– –	– –	– –	– –
17	46	65	58	7 N. W.[2]	5 W.[2]	4 N. W.[1]	do.[1]	W.[2]	W.[1]	– –	– –	– –	– –
18	53.7	69	58	10 E.[1]	– –	10 –	E.[1]	E.[1]	E.	– –	– –	– –	– –
19	57.5	69	61.5	– –	6 W.[1]	8 W.[1]	W.[1]	W.[1]	W.[2]	– –	– –	– –	– –
20	57	60	59	9 S. W.[2]	10 S. W.[1]	10 S. W.[1]	do.[1]	S. W.[1]	S. E.[1]	1½ P. M.	5 P. M.	.63	– –
21	59	68.2	58	3 N. E.[1]	5 S. E.[1]	9 E.[1]	N. E.[1]	S. E.[1]	E.[1]	in night.	– –	– –	– –
22	54.7	56.7	55.5	10 E.[1]	10 –	10 –	E.[1]	E.[1]	do.[1]	– –	– –	– –	– –
23	56	59	53.5	10 –	10 E.[1]	10 –	do.[1]	do.[1]	N. W.[1]	– –	in night.	1.16	– –
24	53	55	45	6 W.[2]	4 W.[2]	– –	W.[1]	W.[2]	W.[1]	– –	– –	– –	– –
25	46	55.2	47	2 do.[1]	6 do.[1]	3 –	do.[1]	do.[1]	do.[1]	– –	– –	– –	– –
26	58	64.5	55	4 do.[1]	7 do.[1]	10 –	do.[1]	do.[1]	do.[1]	– –	– –	– –	– –
27	59	64	56	2 do.[1]	8 N. W.[1]	– –	do.[1]	N. W.[1]	N. W.[2]	– –	– –	– –	– –
28	52	61	50	1 –	4 W.[1]	1 –	N. E.[1]	S. E.[1]	S. E.	– –	– –	– –	– –
29	50	59	53	10 S. E.[1]	8 E.[2]	10 E.[2]	S. E.[1]	E.[1]	E.[2]	– –	– –	– –	– –
30	54.5	59	64	10 E.[3]	10 do.[3]	10 do.[3]	E.[3]	do.[3]	do.[3]	10 A. M.	– –	– –	– –
											Total, . . .	3.22	

METEOROLOGICAL OBSERVATIONS—1856.

OCTOBER.

Day of Month.	THERMOMETER.			CLOUDS. Extent, course, and velocity. 10=wholly covered. [1]=2 miles an hour, [2]=4, etc.			WIND. Direction and force. [1]=2 miles an hour, [4]=25 miles an hour.			RAIN AND MELTED SNOW.			Am't of snow in inches.
	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Hour began.	Hour ended.	Am't of rain and melted snow in inches and hund'ths.	
1	52	58	46	2 W.[1]	5 W.[1]	9 S.[1]	W.[1]	W.[2]	S.[1]	– –	1 P. M.	1.05	– –
2	38.5	53	46	– –	3 do.[1]	1 –	do.[1]	do.[1]	W.[1]	– –	– –	– –	– –
3	46	48	48	1 –	2 –	– –	do.[1]	do.[1]	do.[1]	– –	– –	– –	– –
4	45	55.7	51	3 W.[1]	3 W.[1]	– –	do.[1]	do.[1]	do.[1]	– –	– –	– –	– –
5	46	63	53	– –	2 do.[2]	– –	S. E.[1]	S. W.[2]	do.[1]	– –	– –	– –	– –
6	55.5	69	56.5	– –	8 do.[1]	– –	W.[1]	W.[1]	do.[1]	– –	– –	– –	– –
7	48	55.7	44	2 –	4 N.[1]	– –	do.[1]	N.[1]	do.[1]	– –	– –	– –	– –
8	52	60	50	– –	1 –	– –	do.[1]	W.[1]	do.[1]	– –	– –	– –	– –
9	51	70.7	60	1 –	– –	– –	do.[1]	do.[1]	do.[1]	– –	– –	– –	– –
10	71	76.7	60.5	– –	– –	– –	do.[1]	do.[1]	do.[1]	– –	– –	– –	– –
11	52	70.5	62	– –	– –	3 W.[1]	do.[1]	do.[1]	N. W.[1]	– –	– –	– –	– –
12	46	59.5	51	2 –	1 –	8 S. W.[1]	N. E.[2]	S. W.[1]	S. W.[1]	– –	– –	– –	– –
13	49	61	54	10 W.[2]	10 W.[1]	10 W.[1]	W.[2]	W.[1]	N. E.[2]	– –	– –	– –	– –
14	34	39	31	9 N. E.[1]	4 do.[2]	5 do.[1]	N. E.[2]	N.[2]	N.[2]	in night.	in night.	.57	– –
15	23.5	42.7	34	3 W.[2]	– –	– –	do.[1]	E.[1]	N. W.[1]	– –	– –	– –	– –
16	37	53	47	– –	– –	– –	N. W.[1]	W.[1]	W.[1]	– –	– –	– –	– –
17	42.5	49.5	42	1 –	3 E.[1]	10 E.[1]	E.[1]	E.[1]	E.[1]	1 A. M.	10 A. M.	1.00	– –
18	46.5	52	48.7	10 E.[1]	8 W.[2]	10 –	do.[2]	do.[1]	do.[1]	– –	– –	– –	– –
19	47.5	51	48.5	– –	6 do.[1]	10 –	W.[1]	W.[1]	W.[1]	– –	– –	– –	– –
20	53	61	52.7	3 N.[1]	5 do.[1]	– –	N.[1]	E.[1]	do.[1]	– –	– –	– –	– –
21	57	67.5	55	1 –	– –	– –	N. W.[1]	W.[1]	do.[1]	– –	– –	– –	– –
22	52.5	56.5	53	10 W.[1]	1 W.[1]	10 W.[1]	W.[1]	do.[1]	do.[1]	– –	– –	– –	– –
23	53	49	34	10 do.[1]	3 do.[1]	8 N.[1]	N.[1]	N.[1]	N.[2]	– –	– –	– –	– –
24	27	35.5	30	1 do.[1]	6 do.[1]	– –	W.[1]	W.[1]	N. W.[2]	– –	– –	– –	– –
25	28.5	46	33	– –	5 N. W.[1]	4 W.[1]	N. W.[2]	N. W.[1]	W.[1]	– –	– –	– –	– –
26	36	56	45	6 N. W.[1]	2 –	– –	do.[1]	W.[1]	do 1	– –	– –	– –	– –
27	42	53	46	8 do.[1]	9 W.[1]	10 –	N. E.[1]	S. W.[1]	S. W.[1]	11 P. M.	– –	– –	– –
28	50.5	50	38.7	10 –	1 –	1 –	S. W.[1]	W.[1]	W.[1]	– –	8 A. M.	.47	– –
29	43	44	35	3 W.[1]	5 W.[2]	6 W.[1]	W.[3]	do.[3]	do.[1]	– –	– –	– –	– –
30	44	43	35	5 do.[1]	2 do.[2]	10 –	do.[1]	do.[3]	do.[1]	– –	– –	– –	– –
31	35.7	38.5	30.5	6 do.[1]	5 do.[2]	– –	do.[1]	do.[2]	do.[1]	– –	– –	– –	– –
											Total, . . .	3.09	

METEOROLOGICAL OBSERVATIONS—1856.

NOVEMBER.

Day of Month.	THERMOMETER.			CLOUDS.			WIND.			RAIN AND MELTED SNOW.			
				Extent, course, and velocity. 10=wholly covered. 1=2 miles an hour, 2=4, etc.			Direction and force. 1=2 miles an hour, 2=4 miles an hour.			Hour began.	Hour ended.	Am't of rain and melted snow in inches and hund'ths.	Am't of snow in inches.
	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.				
1	31.5	44	45.5	– –	8 W.1	1 –	W.1	S. W.1	W.3	– –	– –	– –	– –
2	42	61	51	1 –	– –	– –	do.1	do.2	do.1	– –	– –	– –	– –
3	48	64	52	1 –	– –	10 –	do.1	W.1	do.1	8½ P. M.	8 A. M.	1 00	– –
4	54	62	62	10 –	10 W.2	10 –	S. E.1	do.1	S.2	– –	– –	– –	– –
5	34	40	26	2 W.2	5 N. W.4	1 –	N. W.3	N. W.3	N. W.1	– –	– –	– –	– –
6	20	36.5	29.5	– –	2 –	– –	S. E.1	W.1	S. W.2	– –	– –	– –	– –
7	33	48	47.5	5 S. W.1	9 W.2	10 S. W.2	S. W.2	do.2	do.2	– –	– –	– –	– –
8	49.5	59	45	8 do.3	9 S. W.3	10 N. W.	do.2	S. W.2	N. W.2	6½ P. M.	– –	– –	– –
9	35.5	36.0	27.7	9 –	9 W.1	5 do.1	N. W.1	N. W.1	do.2	– –	in night.	.23	– –
10	23	30	24.5	6 N. W.1	– –	– –	N. E.3	N.3	N.3	– –	– –	– –	– –
11	21	38	32	1 –	– –	– –	N.2	do.1	N. W.1	– –	– –	– –	– –
12	36	40	38	9 N. W.2	9 W.1	9 W.1	N. W.1	W.1	W.1	– –	– –	– –	– –
13	30	41	35	5 do.5	5 W.2	9 do.1	do.1	do.2	do.1	[and rain.	– –	– –	– –
14	31	36	32	5 W.1	9 N. E.1	10 N. E.1	W.1	N. E.1	N. E.1	6½ P.M. snow	– –	– –	– –
15	26.5	27	22.5	10 N. E.	– –	– –	N. E.2	N. W.2	N. W.2	– –	10 A. M.	.07	2 inches.
16	20	38	38	6 W.2	10 W.1	10 S. W.2	W.1	S. W.1	S. W.2	– –	– –	– –	– –
17	32	36	26	7 S. W.2	8 do.1	2 –	do.1	W.1	W.1	– –	– –	– –	– –
18	22	32.5	22.5	3 W.1	8 do.2	4 N. W.1	do.1	do.1	N. W.1	– –	– –	– –	– –
19	23.5	36	25	1 –	1 –	– –	N. W.3	N. W.3	N.2	– –	– –	– –	– –
20	16	36.5	31	1 –	– –	– –	do.1	W.1	W.2	– –	– –	– –	– –
21	27	44	37	1 –	4 W.	10 –	do.2	do.1	S. W.1	– –	– –	– –	– –
22	39.5	51	39	10 E.1	4 do.3	– –	S. E.1	do.1	W.1	3 A. M.	11 A. M.	.47	– –
23	31	43.5	36	1 –	5 do.1	10 W.1	W.1	S. W.1	S. W.1	9 P. M.	– –	– –	– –
24	38	48.7	41.5	10 –	8 do.2	10 –	S. W.1	W.1	W.1	[and rain.	5 A. M.	.35	– –
25	33	38.5	32	2 –	8 E.1	10 –	N. E.1	E.1	E.1	8 P.M. snow	– –	– –	– –
26	41	47.5	40	10 –	6 W.2	3 W.2	E.1	W.1	W.2	– –	9 A. M.	.30	¼ inch.
27	28.5	38.5	35	2 –	9 do.2	3 do.2	W.1	do.2	do.1	– –	– –	– –	– –
28	29.5	36.7	25.5	4 W.2	3 do.1	– –	do.1	do.1	E.1	– –	– –	– –	– –
29	21	21.5	21	10 E.	10 –	10 –	E.1	N. E.3	N. E.3	10 A. M.	2 P. M.	.42	– –
30	18	30	27	1 –	8 N. W.2	– –	N. W.3	N. W.2	W.2	– –	– –	– –	4 inches.
											Total,	. . . 2.84	6¼ inches.

METEOROLOGICAL OBSERVATIONS—1856.

DECEMBER.

Day of Month.	THERMOMETER.			CLOUDS. Extent, course, and velocity. 10=wholly covered. [1]=2 miles an hour, [2]=4, etc.			WIND. Direction and force. [1]=2 miles an hour, [2]=4 miles an hour.			RAIN AND MELTED SNOW.			Am't of snow in inches.
	7 A.M.	2 P.M.	9 P.M.	7 A.M.	2 P.M.	9 P.M.	7 A.M.	2 P.M.	9 P.M.	Hour began.	Hour ended.	Am't of rain and melted snow in inches and hund'ths.	
1	18	27.5	21	3 W.[2]	8 W.[1]	2 –	W.[1]	W.[1]	W.[1]	– –	– –	– –	– –
2	22	34	28 7	8 do.[1]	6 do.[1]	10 –	do.[1]	do.[1]	N.[1]	11 P.M. snow	– –	– –	– –
3	25	34	26	10 –	10 –	3 –	E.[1]	E.[4]	N. W.[4]	[and rain.	4 A.M.	0.72	4 inches.
4	29	23.5	18	4 N. W.[4]	3 N. W.[2]	1 –	N W.[3]	N. W.[2]	do.[2]	– –	– –	– –	– –
5	20	25	20	1 –	1 do.[2]	– –	W.[2]	do.[2]	do.[1]	– –	– –	– –	– –
6	19.5	25.5	17.5	2 W.[2]	3 W.[2]	– –	do.[1]	W.[2]	W.[2]	– –	– –	– –	– –
7	21	24.5	16	2 –	1 –	– –	N. W.[2]	do.[1]	N. W.[1]	– –	– –	– –	– –
8	10	15.7	11.5	1 –	3 W.[1]	1 –	do.[2]	do.[1]	W [2]	– –	– –	– –	– –
9	11	19.5	20	10 W.[1]	– –	– –	W.[1]	do.[1]	N. W.[2]	– –	– –	– –	– –
10	12	29	22.5	– –	– –	– –	N. W.[1]	do.[1]	W.[1]	– –	– –	– –	– –
11	28.5	30.5	42	10 –	10 –	10 –	S. E.[1]	E.[1]	S.[2]	3 P.M.	11 P.M.	.56	– –
12	36	39	32	3 W.[2]	4 –	– –	W.[2]	W.[2]	W [1]	– –	– –	– –	– –
13	30	37	30	3 do.[3]	2 W.[2]	10 –	do.[2]	do.[2]	S. W.[1]	– –	– –	– –	– –
14	27	32	41.0	10 –	10 –	9 S. W.[3]	E.[1]	E.[2]	do.[3]	5 A.M. snow	3 P.M.	.91	2 inches.
15	26.5	25.5	19.5	3 N. W.[4]	3 N. W.[2]	9 do.[2]	N. W.[4]	N. W.[3]	W.[2]	[and rain.	– –	– –	– –
16	12	17	11	6 W.[2]	3 W.[1]	1 –	N. E.[1]	N.[1]	N. W.[1]	– –	– –	– –	– –
17	11	9	1.5	3 N. W [2]	3 N. W.[3]	– –	N. W.[1]	N. W.[3]	do.[2]	– –	– –	– –	– –
18	—11	—4.5	—7.5	– –	– –	– –	do.[1]	N. E.[2]	N.[1]	– –	– –	– –	– –
19	—8	13.5	11	2 N. W.[1]	10 E.[1]	10 –	do.[1]	E.[1]	E.[1]	– –	– –	– –	– –
20	16.5	34.5	46	10 –	10 –	10 –	E.[1]	do.[1]	S. W.[3]	3 P.M.	10 P.M.	1.01	1 inch.
21	21	21	19	10 –	9 W.[2]	5 N. E.[1]	W.[2]	N. W.[1]	N. E.[1]	– –	– –	– –	– –
22	13	16.5	16	10 –	10 –	10 –	N. E.[2]	E.[1]	do.[2]	– –	– –	– –	– –
23	15.5	21	24	10 –	10 –	10 –	do.[2]	N. E.[2]	do.[3]	– –	– –	.05	2 inches.
24	16	14.5	8	10 –	10 –	10 –	N. W.[3]	N. W.[3]	N. W.[3]	– –	– –	– –	– –
25	7.5	13	17	5 N. W.[1]	3 N. W.[1]	– –	do.[3]	do.[2]	do.[2]	– –	– –	– –	– –
26	15	20	7.5	9 do.[1]	6 do.[1]	– –	do.[1]	do.[1]	do.[1]	– –	– –	– –	– –
27	12	20	15	– –	– –	– –	W.[2]	W.[2]	W.[2]	– –	– –	– –	– –
28	16	25.5	26	3 W.[1]	10 W.[1]	10 –	N. W.[1]	do.[1]	W.	1½ P.M.	3 P.M.	.05	½ inch.
29	23	32	27	3 do.[1]	6 W.[1]	7 –	W.[1]	do.[1]	S. W.[1]	– –	– –	– –	– –
30	23	29.5	21.5	9 do.[2]	6 do.[1]	– –	W.	do.[1]	N.[1]	– –	– –	– –	– –
31	20	23.5	22	7 do.	7 do.[1]	10 –	N. E.[1]	N. E.[1]	N. E.[1]	– –	– –	– –	– –
											Total, . . .	3.30	9½ inches.

Total of Rain and Melted Snow for the year, 42 inches 7 hundreths. Amount of Snow, 65¾ inches.

INDEX.

Page

Agriculture, system of, ... 7, 8
" number of persons engaged in, ... 8
" promoted by the Embargo, ... 9
" Massachusetts Society for Promoting, ... 10
" Board of, how constituted, ... 69, 70, 72, 76
Agricultural Societies, ... 9, 10, 56, 73, 101, 102
" Head-work, ... 15, 33, 34
" Chemistry, ... 18, 19, 47
" resources, ... 65, 66
" exchanges with other States, ... 74
" Museum, formation of, ... 67, 74, 75
Annual Fairs, ... 55, 56, 65, 66, 164, 165
Apple Trees girdled by mice, remedy for, ... 195
Application of manures, ... 111, 116, 121, 123, 125, 169
Apple-tree Borer, description of, ... 448
Ashes, use of as a manure, ... 125

Bark for tanning, ... 210
" removed increases the solidity of timber, ... 213
Beans, statement on, ... 273, 274
Birch, growth of the, ... 102, 211, 213
Board of Agriculture, how constituted, ... 69, 71
Borers, remedy for, ... 192, 193
Book Farming, ... 39, 42, 45, 55
Bread-making, ... 32, 430, 432, 435
Broomcorn, statements on, ... 274, 276
Bulls, native and grade, ... 335
" foreign breeds of, ... 340, 345
" pedigree of, ... 346
Butter injured by pine boxes, ... 394
" salt for, ... 395
" statements on, ... 395, 396, 400, 401, 405
" reports on, ... 399, 400, 401, 403

Canker-worm, destruction of the, ... 441, 444
Carrots, statements on, ... 278, 279, 281, 167, 168
" letter on, ... 282, 283
Caterpillars, destruction of, ... 185

Page

Cattle, number of, in the United States, ... 365
" value of, in Hampden County, ... 365
" average value per head, in Hampden County, . . . 365
" for the stall, ... 368
Chinese Sugar-cane, culture of, ... 104, 426
Cheese, report on, ... 403, 405
Church and School-house, ... 4
Colts, care and training of, ... 371
" unsoundness of, ... 372
" care of, ... 373, 374
" training and breaking of, ... 374, 375
" raising good ones profitable, ... 374, 375
Compost Manures, general use of, ... 224
" " the economy of, ... 122, 224
" " mode of making, . . . 235, 236, 239, 240
Corn, Plymouth or Webster, experiments with, . . . 262, 263
Cows, difference in, ... 358, 359
" stabled in summer, ... 166, 167
Cranberries, cultivation of, . . . 72, 103, 176, 177, 284, 288, 413
Cranberry Lands, abstract of, ... 288
Crops, large, authentic statements of, ... 14
" bulk no criterion of value, ... 19
Curculio, description of, ... 449

Dairy, average yield of, ... 320, 321, 350, 362
" products of, ... 312, 315, 361, 394
" stock, ... 307, 310, 314, 324, 333
Domestic Manufactures, ... 430, 432
Draining and Subsoiling, ... 42, 44, 93, 135

Earth's crust, description of, ... 60, 63
Educated Farm Labor, ... 14, 57
Experiments at the State Farm, ... 81, 83
" statements of, ... 100

Farmer, the American, ... 35, 37, 38
" of antiquity, ... 38
" the practical, ... 96
Farmers, position of, in Essex County, ... 2, 12
" two classes of, ... 15, 161, 163
" education of, ... 58, 59
" careless statements of, ... 100, 101
" State, at Westborough, ... 69, 76
Farm Implements, ... 173, 174, 289, 290, 291, 304, 307
" products, ... 148, 152
" houses, description of, ... 6, 7, 139, 182
" book used, ... 137, 138
Farming, early, ... 1, 11, 15, 99, 100, 105, 144
" profit of, ... 123, 140, 142, 161

Page
Farming, capital invested in, ... 105, 144
Farms, reports on, . . . 105, 109, 128, 138, 143, 158, 161, 179
" statements on, 107, 130, 133, 139, 141, 142, 145, 147, 149, 156, 181, 182, 183
" entered for three years, ... 153, 155
First Settlers, domestic life of, ... 1
Flowers, report on, ... 410, 411
" mode of managing, ... 156, 160
Forest Trees, cultivation of, . . 46, 102, 103, 197, 201, 207, 213, 214, 218
" " report on, ... 192, 217, 220
" " profit of, ... 198, 200, 203, 205, 210
" " transplanting of, . . . 199, 202, 213, 215, 220, 221
" " time of felling, ... 213
Forests, influence of, ... 203, 205
Frost in low land, ... 28, 29
Fruit, the culture of, ... 19, 85, 93
" trees, method of treating, . 93, 112, 114, 136, 137, 138, 195, 196
" crop, value of, ... 85
" improvement of, ... 85, 89, 137
" preservation of, ... 91
" room, plan of, ... 92
Fruits, report on new, ... 406, 407, 411, 415
Fuel consumed by railroad locomotives, . . . 205, 207, 209, 216

General Court, early Acts of the, ... 3
Grapes, display of, ... 414, 415
Grasses, study of, ... 68
Green crops, as manure, ... 238
Ground bone as a fertilizer, ... 124, 125
Guano, duration of its action, ... 224, 225
" experiments with, 117, 118, 119, 120, 122, 123, 124, 169, 172, 236, 237, 238
" and ashes, ... 119
" value of, over manure, ... 121
" and bone, ... 125

Hedges, report on, ... 222
Heifers, reports on, ... 365, 368
Horses, reports on, ... 278, 279, 371
" breeding of profitable, ... 173, 375, 376
" rules for the entry of, ... 380
Hybridizing, ... 23, 26

Indian Corn, importance of, ... 177, 179, 241, 257
" " mode of culture, . . . 241, 248, 251, 256, 258, 262
" " large crops of, ... 249
" " varieties of, ... 67
Insects, forms and habits of, ... 30, 193, 438, 441

Kelp and Rockweed, as fertilizers, ... 121
Kitchen, facts to be learned in the, ... 32, 33

Page
Labor, value of intelligent, ... 103
Larch, American and European, ... 57, 215, 216

Manures, treatment and effect of, . . 51, 98, 105, 115, 152, 171, 223
" properties of, ... 38, 39, 54
" application of, ... 114, 121, 122, 127, 234, 237
Mares, unsound, unfit for breeders, ... 372, 377
Meats, preservation of, ... 91
Milch Cows, statements on, ... 347, 349, 366, 369, 370
" " report on, ... 358, 364
" " how fed, ... 397
Milk, analysis of, ... 361, 404
" greatest product of, ... 396, 398
" superior for butter, ... 359, 360
" qualities of, ... 361
Mowing Machines, ... 173, 292, 298, 301
" " trials of, ... 295, 299
" " draught of, ... 296
" " abstracts, and statements, . . . 301, 303
Muck, use of, in compost, ... 54

Oak, management of the acorn, ... 216, 217
Oats, statements on, ... 273
Onions, mode of culture, ... 277, 278
Osier Willow, culture of, ... 104
Orchards and Tillage Land in 1650, ... 4, 123, 129, 136
" reports on, ... 191, 194
" statements on, ... 192, 193, 194, 195

Palmer Worm, description of, ... 447
Pastures, mode of renovating old, ... 165, 166
Peaches, statements on, ... 417
Pears, cultivation of, ... 88, 90, 92, 94, 113, 408, 409
" select varieties of, ... 89, 409
" soils situated to, ... 92, 409
" profit of, ... 413
Pear on the quince stock, ... 89, 94, 95
Pines, cultivation of, ... 102, 197, 214
Plant Louse, destruction of, ... 448
Plants, structure and food of, ... 47, 48, 51
" analysis of, ... 51, 53
Plaster, used as a fertilizer, ... 135, 174, 176
Ploughing, reports on, ... 223, 225
Poultry, reports on, ... 392, 394
Potash Water, use of, ... 448
Potatoes, Carter, profit of, ... 280, 281
" varieties of, ... 68
" failure of, ... 172, 173
" Chinese, ... 427
Pruning fruit and forest trees, ... 192, 212

Page
Reclaimed Swamps, ... 176, 185, 187, 190
Root Crops, culture of, ... 39, 276, 277, 280, 282
Rye, culture, great yield and profit of, ... 268, 269
" grains in a head, ... 271
" varieties of, ... 67

Scotch laborers, condition of, ... 36, 37
Science applicable to farming, ... 47, 67
Seed-culture, importance of, ... 22, 23
Sheep, statements on, ... 381, 383
Soil, impoverishing of the 16, 18
" composition and fertility of, ... 51, 61, 65
State Farm, management of, ... 69, 77, 83
" expenses of, ... 84
Stallions, report on, ... 376, 378
Stock, report on, ... 353, 357, 365
Steers for the yoke, ... 346, 347
" report on, ... 367
Squashes, mode of planting, ... 114
" varieties of, ... 424, 425
Super-phosphate of lime, . . . 115, 117, 120, 123, 125, 183
Swamps, mode of reclaiming, . . . 131, 187, 190, 191
Swine, reports on, ... 385, 386, 390, 392
" number and value of in the United States, . . . 385
" improvement of, ... 386

Vegetable deterioration, ... 20, 22
Vegetables, reports on, ... 422, 428
Vegetation, insects injurious to, ... 30, 193, 438, 451

Wheat, culture of, ... 263, 268
" varieties of, ... 67
Woodlands, value of, ... 207, 210, 212

Yam, or Chinese potato, ... 427
Yeast, process of making, ... 435